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Development of Hevea Plantations

Oliver F. Bishop

MUCH has been written about the knowledge the Indians of South America had of rubber before it was known to the more civilized races, the foresight of the pioneers of the rubber plantation industry, and the great difficulties they had in attempting to introduce the rubber bearing plant into countries on the other side of the world. Because their efforts were successful, the wild trees which furnished the only source of crude rubber a comparatively few years ago now cease to be an important factor in supplying the world with this raw material. After the successful introduction of rubber trees in the Far East many years passed before the extensive plantations were established. Slightly over thirty years ago the wild trees of South America and Africa furnished over 99% of the world's supply of rubber. It was not until 1914 that the production from the plantations exceeded that from the wild sources and today the relative importance of the two has been reversed. With the successful introduction of the tree, *Hevea Braziliensis*, into the Far East the stage was set for the growth of an important plantation industry. With the surviving trees furnishing a handy source of seed, plantations were opened and extended as seeds were available and as it became evident that the trees would produce under these new surroundings.

OLIVER F. BISHOP, a graduate of Sheffield Scientific School and of Yale School of Forestry, has a background of 25 years' experience in forestration and plantation work. Five years with the United States Forestry Service included three years in the Philippine Islands, where along with other duties he was district forester over an area of more than 6,000,000 acres.

Mr. Bishop spent ten years on a large rubber company's plantations in Sumatra, where for seven years he was engaged in planting, tapping, disease control, and other forestration development activities and for three years was head manager of the plantations. His description of rubber plantation activities presents the results of intensive study and an intimate knowledge of the subject.

The factors which aided in the extensive operations in the Far East were an ideal climate over large areas and abundance of cheap land and labor.

Clearing the Jungle

The opening of a rubber plantation is in every way a pioneering operation except where it is an extension of an existing plantation. If the area is covered with virgin jungle, it is difficult to lay out much of the work ahead. The absence of roads and buildings makes the construction of temporary ones necessary. While these are being constructed, the work of felling the jungle can proceed. Within a very short time the whole area is a picture of destruction. As soon as possible, sites must be selected for the establishment of nurseries. The success of the next stage depends entirely on the weather and good judgment of supervisors. After a certain length of time the felled timber and tangle of undergrowth is considered dry enough to burn. If the conditions for burning are favorable, all the smaller trees and undergrowth will be consumed. The work of piling and burning everything that remains can now be carried on systematically. Certain

timbers can be salvaged for bridges and building material. Where transportation is difficult, obtaining lumber and construction timber right on the cleared area is important.

Next is the problem of removing the stumps. Many areas have been planted without stump removal, but the wisdom of this procedure is often questioned. The presence of dead and decaying wood offers an ideal breeding place for various forms of fungous growth which will later spread and do considerable damage to the planted trees. The removal of the stumps is a slow operation and one which requires rather careful supervision as the natives often put dirt over the roots or base of the stumps rather than remove them. The stumps and the larger surface roots which have been removed are all piled in order to facilitate their burning.

The operations described thus far have been done entirely by hand. More up-to-date methods have been tried in opening some areas, but they have not proved to be of much, if any, advantage. Various types of stump pullers, which uprooted whole trees, and mechanical saws to cut them up after they were down have been used on some of the so-called more progressive estates; but when maintenance and additional labor necessary are considered, it is difficult to compete with the primitive methods. The same is true where tractors have been used for cultivation. If the labor was not so cheap and was of a more intelligent type, the picture might be entirely different.

Young Mature Rubber, Six to Seven Years Old

The entire area now undergoes a series of thorough cultivations. These are carried on to a considerable depth, and all the roots and decayed wood brought up is piled for burning. In practically all jungle areas there have been primitive clearings made for native cultivation. The natives prefer to cultivate only virgin soil, and, therefore, after a few crops the clearing is abandoned and a new one made. This is done not only because the yield is less after a few crops have been harvested, but because a strong, coarse grass has obtained such a foothold as to make cultivation impossible without a large amount of hard work. These grass areas, therefore, require a much more thorough cultivation than the surrounding areas in virgin jungle. All the tough grass roots must be removed to eradicate the pest. From the time the final cultivation has been finished until the estate is abandoned as of no further value there is a constant fight to keep weeds and grass out.

Thinning a Plantation with 17-Year-Old Trees

Tree Location

The next operation to receive attention is the marking out of the lines and the spots where each tree is to be placed. This work was formerly done in a more haphazard manner than on the later plantations. The early planters did not realize that they were planting a permanent crop and that the mistakes would be in evidence for years. Many of them had planted annual crops where mistakes could be corrected from year to year. The fact that the rows are crooked will not affect the growth of the trees or the yielding power, but carelessness in any operation cannot be permitted when laborers of a low order of intelligence are used.

The type of holes made depends on the type of planting stock used. In any case they are carefully made and compare favorably with the planting holes made in good orchard work.

Stock for Planting

When it was realized that plantations of Hevea rubber trees were the only solution to the serious problem of obtaining a supply of crude rubber to satisfy the increasing demand, there was a rush to open new and extend existing plantations. This badly overtaxed the available supply of seed. All plantations have come, either directly or indirectly, from seed from the original trees imported into Ceylon. The importance of these few trees can now be realized. As the extensive plantations began to develop and mature, the seed supply became very plentiful. Other factors had developed by this time so that the more progressive planters were selecting their seed.

It had become evident that there was a marked difference between the trees. Some could be depended upon to give a large production, and others did not pay for their upkeep. This was true regardless of the class of stock used or the type of material planted. Some planters preferred to plant seeds in the spots where a mature tree was to stand. Others chose to use seedlings grown in coarse baskets as a florist would use pots. Still others would set out nurseries and, when the trees were sufficiently developed, they would be dug up, cut back and planted in prepared holes as fruit trees are ordinarily planted. Whatever method was chosen, the resulting trees showed a marked difference in yield. The productivity of a tree depended on some inherent quality and not on any treatment. A tree that had the quality of high production would show this tendency whether it was growing on good or bad soil, but, of course, it would show the best results where the conditions were favorable.

Selective Propagation

Extensive experiments have shown that these differences in yielding power are very marked and that a tree in normal health will remain in its own yielding class. A tree which does not inherit the quality for high production will never develop that quality. The establishment of this fact has had a decided influence on many plantation operations. Thinning work can be given as an illustration. The tendency on the earlier plantations was to plant a large number of trees on any given area with

the idea of obtaining a larger yield from the larger number of trees. This had its advantages, but when the trees began to crowd, some had to be removed. Before the difference in yielding power of individual trees was known the common method of thinning was to remove every other row of trees. The result was that good trees were removed along with poor ones.

The condition of the remaining trees was improved by this treatment, but the potential yielding capacity of the area was reduced by the number of high yielding trees removed. This variation in yielding capacity of the trees is so marked that the removal of one high yielding tree might have a more adverse effect on the production than the removal of ten low yielders. The more progressive planters now realize that the better trees should be favored and reproduced. The common methods available for attempting to reproduce these high yielding trees were three in number: seeds, cuttings, and grafting or budding. The seeds from the selected trees in a mixed plantation could not be depended on to reproduce only the better trees because only one of the parent trees, namely the mother, is known. However, until such time as seeds can be obtained from two high yielding parents without any outside influence, these plantation seeds should be considered as selected seeds because at least the mother tree is known.

Bark Disease on Tapping Area of Mature Tree, 15 Years

Seeds from each individual tree have distinguishing features, as shape or marking (pattern) or both, so that all the seeds originating on a single tree can be picked from a mixture of seeds providing one seed definitely known to be from that tree is available for comparison. The seeds from buddings made from the branch wood of that particular tree will resemble closely the seeds from the parent tree. The seeds from seedlings grown from this tree may be quite different from those of the mother tree because in this case only one parent is known.

A more direct way to obtain a young tree having the yielding characteristics of the parent seemed to be by planting some part of the parent which would establish itself and develop into a tree. Many tropical trees grow from branch wood which has come in contact with the ground or has been partially buried. These are known as cuttings. This method of reproducing the rubber tree has been tried; thousands of cuttings have been planted, using various treatments to induce root development, but the percentage of success was almost negligible.

Root Disease Treatment in Mature Rubber, 12 to 14 Years

With the success of bud grafting each bud on the parent tree became of importance and value; therefore cuttings, each of which had several buds, would have been undesirable even if they could have been planted with 100% success. Budding and bud grafting are used extensively in the propagation of desirable fruits, shrubs, and flowers, and the same principle was applied to the propagation of desirable strains of rubber trees. Buds from high yielding trees are introduced on to the stems of young trees, and when established, the strength of the undisturbed roots causes the bud to grow and thrive as one of the tree's own buds would develop if the tree had been cut back or damaged. There are many difficulties encountered in introducing the bud, which are not found in performing the same operation on fruit trees. One of these is the presence of latex which exudes as soon as the tree is cut for the introduction of the bud. The operator must develop a high degree of skill, and the bud, to serve its purpose, must be established as low on the trunk as possible. Any seed can be used for establishing nurseries for budding as any normal, healthy root system is capable of supplying sufficient food and support. After it is known that the bud has been successfully established the tree is handled the same as other nursery stock.

Cultivation

After an area has been prepared for planting there is a constant struggle to prevent obnoxious weeds from obtaining a foothold. Weeding and upkeep on young areas must be constantly carried on. An area not carefully and regularly attended to will revert to the wild state. As the plantation develops and grows, more shade is cast by the trees, and the upkeep becomes less difficult, but it can never be abandoned if the plantation is to be maintained in proper condition.

Disease

Every estate is subject to attacks or infection by several diseases even though much time and expense may have been spent in the preparation of the ground before planting. Some of these diseases are found in the crown; others are found on the roots, and probably the worst from the viewpoint of yield are those which occur in the bark either on the tapping area or near the base of the tree. Diseases in the crowns of the trees are relatively unimportant.

Root-diseased trees require more attention. They are usually found in groups, if the infection is an old one, because very often the roots from one tree come in contact with the roots of neighboring trees, and disease will spread through contacting roots. If the disease is found and treated when only small roots have been killed, little or no harm has been done. When some of the large roots are killed, however, a condition of starvation exists on that part of the tree, and the trunk develops unevenly and becomes fluted. This may be sufficiently serious to make tapping difficult or even impossible. The number of trees lost by root diseases may be large, especially in young areas.

The most serious diseases with which to deal are those that attack the bark on the tappable part of the tree, the most common disease being known as brown bark. The diseased bark turns a characteristic brown color and ceases to produce latex. The bark on the lower part of

the trunk above or below the tapping line is affected. It may be a small spot which will cause the tree to cease yielding for a short time, or it may embrace the whole side of the tree so that tapping cannot be carried on for a period of years. Other than the infected area, the tree appears normal in color and in a healthy condition. Some trees seem to be much more susceptible than others; but unless other complications set in, this disease is not fatal to the tree. However several trees per acre may be out of production at one time. Various methods of combatting and controlling these diseases have been used with some degree of success.

Wind

In some tropical countries where soil and rainfall are unfavorable, wind may be a controlling factor. Where there is a prolonged season of high winds, the risk of planting rubber is too great. Ordinarily, however, wind damage is not so severe as disease and is confined to some broken branches and the uprooting of some trees, especially those in low-lying areas and those having damaged or defective roots.

Drainage

Soil drainage offers a problem which cannot be overlooked. For its best development a rubber tree requires a deep, well-drained, soil offering little mechanical resistance. Where all the factors are favorable, the rubber tree has a deep, well-balanced root system. The presence of a high water table checks the normal root development, and this has its effect on the development of the tree. It is essential that all low areas should be as deeply drained as is practical. At the other extreme there are areas which are deficient in soil moisture. On very loose-textured soils and on steep slopes where there is excessive run-off, the soil is impoverished and dry. Under such conditions it is imperative to hold back some of the water so that it can penetrate the soil. This necessity has led to the practice of making numerous, shallow drains or holes and mounds of earth known as catch drains. These are highly developed on some hilly and rolling estates, checking very effectively the excessive run-off which depletes and forms gullies in the loose soil which had been previously protected by the jungle cover and roots.

Production

When the trees reach a proper age and size, they are ready to be brought into production. Trees of suitable size for the beginning of operations are often obtained in five years. The plantation is then considered mature and is treated as the other areas which are producing. To understand the operations in connection with obtaining the latex from the rubber trees it must be kept in mind that the latex is not the sap of the tree as is the case of maple sugar. Latex, when it is first released by the tree, is a white milky substance about the consistency of cream. It is found in all parts of the tree: trunk, branches, roots, and leaves, but throughout the woody part of the tree it is found only in the bark. It is not vital to the growth of the tree. The bark yielding the highest quantity of latex is found at the base of the trunk. It is, therefore, most profitable to work on this part of the tree, not going higher than necessary to insure continuous production.

The operation of cutting the bark of the tree to cause the flow of latex is known as tapping. Tapping a tree requires much practice and considerable skill. It is one of the most delicate operations used in harvesting any crop. The cells containing latex are usually closer together as one approaches the cambium, and farther apart and mixed with stone cells in the outer part of the bark under the corky layer. To obtain maximum production, therefore, it is necessary to tap as deep as possible, but extreme care is necessary to avoid injuring or exposing the cambium. Tapping consists of cutting a thin shaving of bark at an angle around part of the circumference of the tree. Tapping systems have undergone many changes since the beginning, and in practically every case the change has been towards simplifying the system. The latex runs down the channel and into a receptacle. From many cuts daily it has been reduced to a single cut periodically. As the aim must be to have a continuous production, careful consideration must be given to the problem of having suitable bark for tapping after the original bark has been exhausted. If the tapping has been done carefully with the absence or a minimum of wounding, the bark will renew itself, provided the tree has been kept in a normal, vigorous condition. The length of time required for renewal of the bark varies, but a tappable bark can be grown in six years. Any tapping system used is a compromise between the various factors entering into it. Each time a tree is tapped a thin shaving of bark is removed along the full length of the cut. This shaving must be thick enough to open the small cells in the bark which produce or hold the latex as these cells become plugged with coagulated latex. However, too thick a shaving, beyond a certain point, is of no advantage from a standpoint of yield and is very wasteful of bark. After the incision has been made in the bark the latex flows for a short period; then the cells are again sealed and will not flow again until a new incision is made. This operation is repeated daily or at such intervals as may be desired.

Soil Improvement

The average soil, that is, a soil having a good texture and drainage is sufficient for the development of a healthy, thrifty stand of rubber trees. The application of fertilizers to such areas undoubtedly increases the vigor of the trees, but because of the deep, normal root development it is doubtful if the full value is obtained. In undernourished areas or where other adverse factors prevent the trees from reaching their best development, the added expense of applying commercial fertilizer is repaid.

Native Plantations

Because of the huge sums spent in establishing and developing rubber plantations it would be well to mention one of the principal competitive sources of crude rubber in the Far East. It is difficult even to approximate the amount of rubber which could be obtained from native-owned trees because these vary from a few scattered trees to rather extensive areas. In the smaller groups the outlay has been negligible. A few seeds are planted quite the same as is done with various fruits. Nothing further is done to the trees unless the price of crude rubber is high. The tapping becomes a family affair, at no extra cost, and the numerous small and large amounts of crude rubber are brought on the market. Whatever is obtained by the native is clear profit. When the price of rubber does not justify tapping the trees stand idle, the same as any shade tree, and rest and develop. Little thought is given to diseases. Handled in this way rubber is an ideal crop for the natives.

Conclusion

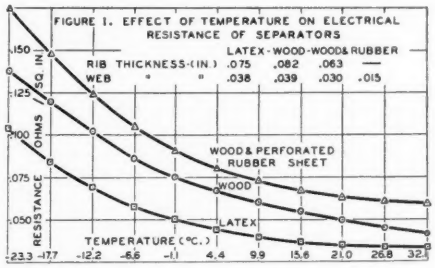
Costly errors made by the pioneer planters can now be avoided. Much scientific data are available at present on which to base many phases of the work. Considerable work still must be done in establishing high yielding strains that will produce uniform results and high yielding strains that have greater immunity to disease.

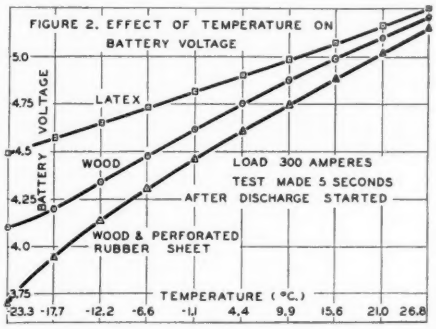
Latex Battery Separators[1]

Preparation and Properties

H. W. Greenup and L. E. Olcott[2]

THE commonly used electrical storage battery consists of alternate negative plates of sponge lead and positive plates of lead peroxide immersed in an electrolyte, sulphuric acid; the whole is enclosed in a hard rubber or bituminous composition case. These plates are ordinarily separated from one another by ribbed sheets of wood called separators. The separators prevent short circuiting of the plates caused by actual contact of the plates with each other or by "treeing" (formation of lead crystals between the plates). The separators must be thin, in order to make the battery as compact as possible, and yet must be durable. It is necessary that they be highly porous so that their electrical resistance will be low, but the pores must be sufficiently fine so that "treeing" does not take place.





Wood separators are ordinarily made of Port Orford cedar. They are usually given a preliminary treatment in warm, dilute sodium hydroxide solution to swell them, thus increasing their porosity, and to remove injurious substances which cause self-discharge and corrosion of the plates. Wood separators have the advantage of being inexpensive and of having fairly low electrical resistance, but they are not so resistant to the action of sulphuric acid and the oxidizing action in the cell as is desirable. They are, in many cases, the first part of the storage battery to fail and must then be replaced if the battery is to give further service.

Many materials have been used as substitutes for wood in battery separators. Among them are finely divided, fritted glass,[3] thin sheets of wood coated with rubber,[4] asbestos and zinc dust molded with a phenolic condensation product and treated with acid to remove the zinc,[5] sliced tripoli,[6] cloth or paper impregnated with synthetic gum,[7] Filtros treated with hydrous silica,[8] aluminum oxide with a vitrified bonding material,[9] cloth coated with celluloid,[10] bird feathers treated with sodium sulphide,[11] cork or wood bound with latex,[12] pyroxylin and sodium silicate mixtures,[13] etc. As far as the present writers know, none of these materials have been used extensively.

Rubber, especially ebonite, has been much more successful than any other material as a substitute for wood in battery separators. In 1915 Willard[14] prepared "thread rubber" separators by plying up layers of fabric or cords coated with hard rubber stock, slicing in a direction perpendicular to the cords, and curing the slices. The use of sheets of perforated hard rubber in conjunction with wood separators has been common in the industry for several years in some types of batteries. Wilderman[15] prepared hard rubber separators with fine pores either by binding hard rubber dust with a hard rubber cement and curing the resulting product under light pressure, or by curing semi-cured hard rubber dust under light pressure without a binder.

Recently the commercial production of porous ebonite separators from latex has been started.[16] In 1915 Schidrowitz[17] discovered that a porous product could be obtained by vulcanizing coagulated latex under such conditions that the serum was retained in the coagulum during vulcanization. The latex coagulum has a reticulated structure; that is, both serum and rubber are continuous phases. The same thing was observed by Hopkinson,[18] who vulcanized a plastic, highly compounded latex mixture in open steam to form a product which was porous when cured. By using sufficient sulphur, a porous ebonite product may be obtained by the Schidrowitz process. It is a product of this type that is used for battery separators.

Preparation of Latex Separators

For the purpose of comparing latex and wood separators, the former were prepared from a mixture of the following composition (in grams):

Centrifuged latex (60% rubber)	166.6
50% sulphur suspension	96
40% zinc oxide suspension	5
Ethylene diamine	5
Mercaptobenzothiazole	1.6
25% diphenylguanidine suspension	7.1
Water	15.3
	296.6

The sulphur and diphenylguanidine suspensions, which

[1] Paper presented before the Division of Rubber Chemistry at the ninety-second meeting of the American Chemical Society, Pittsburgh, Pa., September 7 to 11, 1936. Reprinted from *Ind. Eng. Chem.*, Feb., 1937, pp. 192-94.
[2] Firestone Tire & Rubber Co., Akron, O.
[3] Rodman, U. S. patent No. 1,051,677 (1913).
[4] Carpenter, U. S. patent No. 1,087,637 (1914).
[5] Bliss, U. S. patent No. 1,206,983 (1917).
[6] Baird, U. S. patent No. 1,279,074 (1918).
[7] Wales, U. S. patent No. 1,366,223 (1921).
[8] Thatcher, U. S. patent No. 1,393,467 (1922).
[9] Anderson, U. S. patent No. 1,458,377 (1923).
[10] Benner and Heise, U. S. patent No. 1,484,928 (1924).
[11] Wood, U. S. patent No. 1,502,455 (1924).
[12] Norris, U. S. patent No. 1,567,747 (1926).
[13] Pederson, U. S. patent No. 1,732,140 (1930).
[14] Willard, U. S. patent No. 1,243,368 (1915).
[15] Wilderman, U. S. patent No. 1,651,567 (1927).
[16] Beckmann, U. S. patent No. 1,745,657 (1930); Greenup, U. S. patent No. 1,959,160 (1934); Madge, U. S. patent No. 377,751 (1932).
[17] Schidrowitz, British patent No. 1,111 (1915).
[18] Hopkinson, British patent No. 220,591 (1922).

contained glue as the protective colloid, were ground in a pebble mill. The zinc oxide suspension, which contained Saprotin (a commercial dispersing agent), was also ground in the pebble mill. This mixture was poured into a mold having the shape of a battery separator and cured in open steam until at least 90% of the sulphur present was combined.

Electrical Characteristics of Latex and Wood Separators

Since starting and lighting batteries are required to furnish discharge currents of as high as 300 to 500 amperes, low internal resistance, and therefore low resistance of the separators, is of great importance. In this work the resistances of latex separators, Port Orford cedar separators (soaked in acid three weeks), and a combination of Port Orford cedar and perforated hard rubber sheets were determined. The sheets were 0.015-inch (0.38 mm.) thick and contained small diamond-shaped perforations which gave them a porosity of approximately 48%. The method described by Vinal[19] was used in making the measurements. A hard rubber battery case, containing two diaphragms approximately 2 mm. apart, was filled with sulphuric acid of 1.280 specific gravity (26.6° C.). The diaphragms contained circular holes over an area of 10 square inches (64.5 sq. cm.). Current and potential electrodes were placed on each side of the double diaphragm, and the potential difference set up by the current electrodes was measured by means of a Kelvin bridge equipped with an alternating current galvanometer. The separator was placed between the two diaphragms, and its effect upon the potential difference measured. Figure 1 shows the results obtained at 80° F. (26.7° C.), 40° F. (4.4° C.), 10° F. (—12.2° C.), 0° F. (—17.8° C.), and —10° F. (—23.3° C.). The difference in electrical resistance between latex and wood, or wood and perforated rubber sheets, increases as the temperature becomes lower.

The effect of this difference in electrical resistance upon the performance of a battery, as measured by terminal voltage, is shown in Figure 2. Three-cell, thirteen-plate batteries, containing positive plates 5⅜ inches (13.65 cm.) high, 5⅝ inches (14.29 cm.) wide, and 0.100 inch (2.54 mm.) thick, and negative plates 5⅜ inches high, 5⅝ inches wide, and 0.90-inch (2.29 mm.) thick, were insulated with the three types of separators. The batteries were placed under a load of 300 amperes, and their terminal voltages were measured five seconds after the start of the discharge. The batteries were cooled in a mechanical refrigerator for the tests made at temperatures below 80° F. (26.7° C.). The lower electrical resistance of the latex separators, especially at low temperatures, is demonstrated by the higher voltage of the battery containing them.

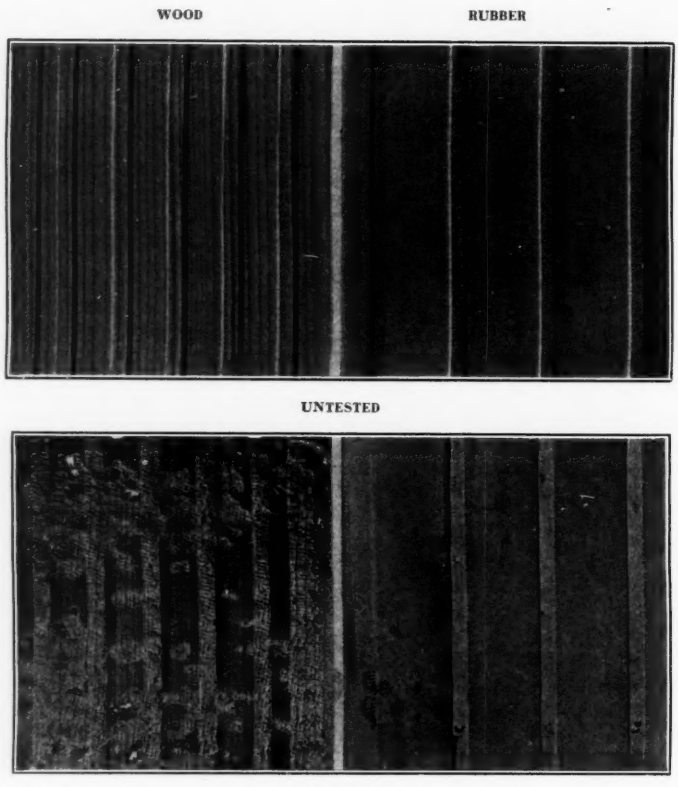


Fig. 3. Comparison of Cedar and Latex Separators before and after a Life Test of 13,000 Cycles in a Battery

To determine just how much this higher voltage of the battery containing latex separators would mean in actual service, the speed at which batteries containing the three types of insulation would turn an automotive starting motor, under constant load, was determined. A Prony brake was connected to a starting motor taken from one of the popular lightweight cars. The tests were conducted on batteries cooled to 0° F. since starter speed becomes important at low temperatures. In making the tests the brake tension on the starting motor was adjusted to cause a load of 300 amperes on the battery. The results obtained follow:

Separator	Battery Voltage	R.P.M. of Starting Motor
Latex	4.57	380
Port Orford cedar	4.20	278
Port Orford cedar plus perforated hard rubber sheets	3.95	220

Service Life of Latex and Wood Separators

No matter how good the electrical characteristics of a separator are, it is worthless if it will not withstand the action of the sulphuric acid and the oxidizing action of the positive plates of lead peroxide. The separator must neither soften in service, as it would then be cut through by the plates, nor swell and prevent proper circulation of the electrolyte. These properties are usually determined by the life test, which is run in the following manner on batteries containing the separators to be tested:

1. Charge at ten amperes for six minutes and 25 seconds.
2. Allow to rest for three minutes.
3. Discharge at a rate of 300 amperes for five seconds.
4. Allow to rest for 30 seconds.

This cycle is repeated continuously for six days. On the seventh day a capacity test is made on the battery and the battery is recharged. The cycle is again repeated continuously for six days, and the test is continued in the same manner as long as desired. As the battery attains a temperature of 110° to 120° F. (43.3° to 48.9° C.), the test becomes quite severe. Figure 3 shows sections of latex and of Port Orford cedar separators removed from standard 13-plate batteries after a life test of 12,000 cycles. The battery containing the wood separators had failed, but the one containing the latex separator had not. Life tests of 24,000 cycles have resulted in disintegration of the plates without failure of the latex separators.

[19] Vinal, "Storage Batteries," p. 51, New York, John Wiley & Sons, 1930.

Rubber for Independent Spring Suspension Systems

Colin Macbeth

RUBBER spring advocates are increasing in their efforts to provide an improved springing system for automobiles, knowing that as a shock cushioning medium no other material has the same ability for "shock absorption" due to hysteresis losses occurring when distorting soft compound rubber. As a substitute for conventional springs, it has not always been realized that rubber springs must also function as the half elliptic spring does today, for axle location, to counteract brake torque, and to allow of axle flexion, etc. Rubber spring units have been built up as semi-elliptic spring substitutes fitted into existing chassis, but there is no prospect of doing so on a basis competing with leaf springs. Hence the rubber man has two alternatives: develop new chassis to enable his units to be used; so adapt his springs that they will not only fit conventional automobiles, but that the great advantages derived from their usage cannot be ignored or met by other means.

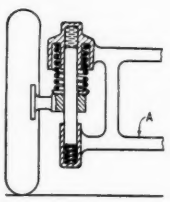


Fig. 1

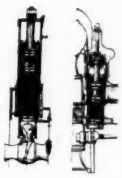


Fig. 2

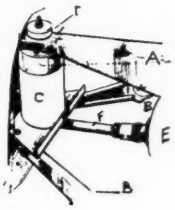


Fig. 3

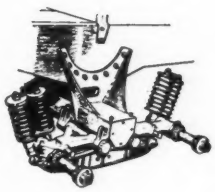


Fig. 4

Direct Compression Units

A description will now be given of several individually designed types of suspension involving four general methods of application.

DE LAVAUD TYPE. This type was applied to wheel suspensions of the Lancia type. (Figure 1.) De Lavaud substituted the steel coiled spring by a column of rubber disks centered and guided by a steel rod. This application to front wheels was as in Figure 2, where it will be noted that there are disks to take the load and to take the rebound. This design for front wheels entails a considerable offset between tire and king-pin centers, additionally the steering resistance is high. The tall column of disks, as in Figure 2, reduces the effective rear seating width. The use of increasingly soft springs prohibits the use of these tall spring columns. On rear suspension De Lavaud's column was spherically joined to a conventional rear axle.

ROVER TYPE. (Figure 3.) A rubber cylinder was used in direct compression. The load was light and so used should have been successful though the rubber units should be nearer to axis B, thus reducing endwise compression while increasing the diameter of unit C. throughout. So doing would call for oscillating seats at the spring ends.

SCAMMELL TYPE. (Figure 4.) This application to a rigid six-wheel lorry uses rubber columns in conjunction with a rocking beam attachment for the rear driving wheels shod with specially large tires. Spencer concentric rings are employed as the sole flexible member of the chassis. The chassis makers do not ask for any great compressibility of the rubber columns, as the provision of the rocking beam and "outsize" tire section in themselves suffice to take care of shocks from all but extreme axle movements. On such a suspension this use of rubber as an auxiliary springing medium should continue to give excellent results. It should be noted that the rubber springs contribute to the unsprung weight.

Indirect Compression Units

SWASS TYPE. *Indirect compression columns.* Little was published on this attempt. Figure 5 indicates the use of four wheels mounted on bell cranks, the short end of each crank arm passing the load to a long column of concentric rings and to a short column for rebound. This design apparently embodied Spencer concentric rings so universally used for railway draw and buffer springs. It will be noted that the spring units were housed below the floor of the car and on each side of the propeller shaft, making a very snug job. No information as to results are known to the author.

Fig. 5

HARRIS LEON LAISNE TYPE. *Indirect compression cylinders.* Harris Leon Laisne used rubber springs on a number of chassis and used a bell crank arm for attaching each wheel to the frame, as in Figure 6. To the short arm of the bell crank is attached a piston rod having a plate secured to it. The plate engages a rubber cylinder, which is a clearance fit around the piston rod and, when loaded by the plate, is pressed against a flange on the chassis frame. The rebound is taken by a shorter rubber cylinder which, when loaded, is pressed against the cup-like adjustable container. This suspension in practice provided very comfortable results, but there were serious difficulties in arriving at rubber units free from local abrasion. From the chassis manufacturer's point of view the heavy loads on the short bell crank arms caused trouble in the arm bearings, and

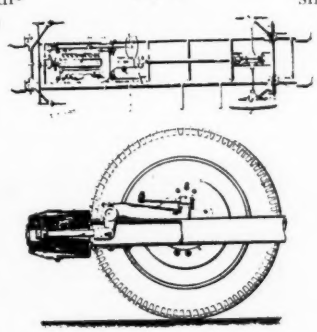


Fig. 6

it was found advisable to build up the frame of welded tube construction. When braking and accelerating, serious vertical oscillations occurred in the chassis, and no effective means was provided to combat them. This use of compression rubber was a very bold attempt to use rubber cylinders as springs. The cylindrical containers projected seriously at the chassis ends, increasing unduly the overall length.

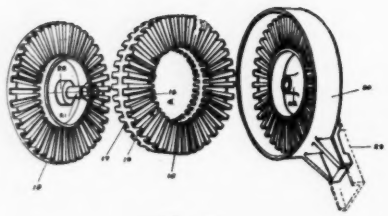


Fig. 7

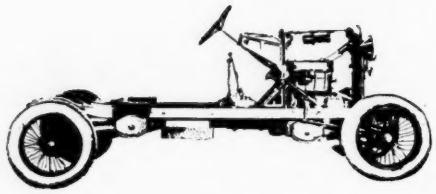


Fig. 8

Torsion Springs—Frictionally Gripped

ADAMS TYPE. This application of rubber centered on using double-sided radially corrugated rubber rings, as in Figure 7. Here a metal disk 19 was attached to the chassis side frame. The rubber ring 15 was clamped between another oscillating loaded arm 20 and the fixed disk 19. Figure 8 shows four such load-supporting arms attached to chassis frame at four points and to each axle at two points. This adaption called for universal and flexible connections at the axle attachment points, and obviously, when so fitted, the chassis end lever arms became subject to cantilever loading forces which proved serious, and such as the chassis frame shown was not fitted to withstand. While the use of such flat radially toothed rubber units was considered an interesting new development, in practice it was found that gripping or clamping contact does not suffice to provide a durable rubber spring unit.

Composite Torsion Units

MACBETH TYPE. *Development of units.* Experience gained when using Adams-type disks on the road lead to the development of disks, as shown in Figure 9. A springing unit consisted of a ring of rubber sandwiched between a pair of metal cones and permanently secured to the cones by vulcanization or similar methods. The metal cones are mechanically connected to parts of the chassis, having a relative angular movement. The figure shows the use of hard rubber between the metal cones and the rubber sandwich; such hard rubber is not an essential in the build-up.

It has been found that the "bonding" of rubber to metal, as practiced for many millions of tire miles with solid tires, provides a perfectly reliable junction of the flexible rubber member to the rigid metal member.

Flat rubber disks or rings subject to torsion are subject to the same laws as apply to torque loaded hollow shafting; the outer portion of a flat rubber disk is heavily loaded and the inner portion lightly loaded, and though such disks vulcanized to metal plates have the advantage of a fine bond, yet the load is unequally distributed throughout the body of the flexible and rigid elements. The search for a reliable method of insuring equal loading throughout the rubber unit led to the development of coned or concave plates having the interposed resilient rubber ring of wedgelike section, shown in Figure 10, where we see flat and wedge shaped corrugated disks compared with the composite wedge unit which gives the maximum thickness of the rubber wedge at the outer periphery.

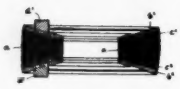


Fig. 9

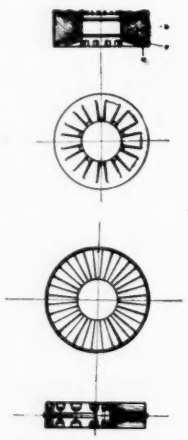


Fig. 10

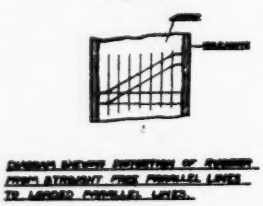


Fig. 11

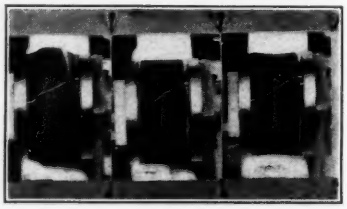


Fig. 12

Such a "sandwich" resembles a differential gear set where there are two crown wheels, one fixed and one moving, the bevel pinions being continuous around the crown wheel circumference and the "tooth," pressure not varying along the face of each "tooth." The rubber in all parts of such units is equally stretched under all torque loads.

The following discussion emphasizes the possibilities of practical application of rubber and its effects upon wheel suspension in automotive engineering.

Distortion in Disk Units

Figure 11 shows how the rubber between the two metal cones is distorted from a straight-line connection. The squares marked on the surface become rhomboids on distortion, and it will be noted that these are equally distorted across the face of the rubber except adjacent to the bond to metal disks, which areas are not distorted at all. It is well known that distortion at the junction of metal and rubber is fatal and would cause early failure.

Figure 12 shows surface distortion on disks having respective convex, flat, or concave peripheries. The condition under which rubber operates in the disk units is very favorable to long life, thus:

No abrasion of the surface occurs.

Nothing but air currents come in contact with the rubber.

The rubber is loaded equally throughout its structure, except only that at the inner and outer edges of the bonded faces the tangential loading is substantially diminished.

Heat generated in the rubber is rapidly dissipated owing to the large exposed area sufficient to prevent overheating in still air.

The spring in use is subject to strong currents of air which insure heat dissipation in hot countries.

The units are not exposed to the sun when fitted in the usual shaded places on chassis.

The action of oil is easily guarded against.

No new problem arises in determining suitable compounds and methods of manufacture of such units.

The metal parts incorporated in the units require little machining and the faces bonded to the rubber require no preparation beyond insuring that they are clean, dry, and of the required contour and finish for good bonding to rubber.

Figure 13 shows a comparison be-

tween power losses in a steel spring and in the disk units. The hysteresis losses in the Macbeth bonded disks are commonly 16 to 18% on static tests and may be increased up to 25%.

Front-End Suspension Application

Torque loaded spring units are easily applied at one or several of the fixed or moving arms of parallel link-type wheel suspensions, the development of which was desired by the automobile manufacturers. The first design is shown in Figure 14, illustrating a unitary dead axle supporting and bolted to a conventional frame. It will be noted that this type incorporates the following features: standard frame, wheels, brakes, and king pin; inclusion of all steering arm and track rod connections, and drag link attachment calling for no change in steering-box location; anchoring of two torque loaded rubber units to an adjustable splined shaft rigidly held in the axle unit ends; snug laying of spring units, allowing increased wheel lock in both directions; forward placing of center steering lever allowing great freedom as regards forwardly placed engine; track rod connected diagonally to trailing steering levers insuring that on full deflection and rebound and in running and fully locked positions there is less than 1° of wheel interference; provision for the use of standard hydraulic shock absorbers acting about the fixed axis of the lower lever arm.

Before arriving at this design a close study was made of known types of parallel link suspensions, more particularly in order that any unit comprising rubber springs should be free from criticism as regards wear due to tire scrub or vibration due to change in wheel camber. To meet these requirements it seemed essential to use the short top arm system which entirely meets the tire scrub trouble and limits the camber change effect. A first study of this job indicated that the links were required to be about 21 inches and 11 inches long. In laying down the design it became obvious that such lengths had come into common use not to obtain the required wheel travel, but to minimize the concertina action on coiled compression springs, and in many cases because the bottom link used is a laminated transverse spring.

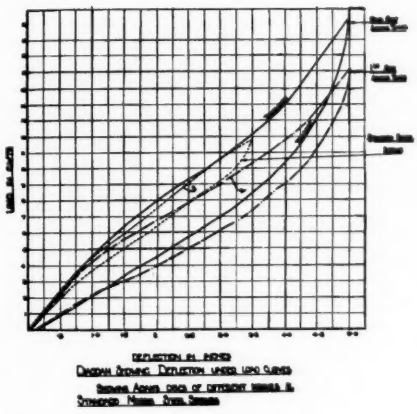


Fig. 13

For a given wheel mounting the links may be reduced to about one half the length with no change in wheel track and with a camber change only appreciably increased on extreme rebound. When this comparative freedom of choice of length of links was taken advantage of, it became possible to design a suspension unit applicable without requiring material changes in existing chassis, wings, engine mounting, etc. Furthermore other important advantages are: low unsprung weight; reduced cost of parts; increased resistance to brake torque and lateral loads; freedom from having to use costly cross-member build-ups.

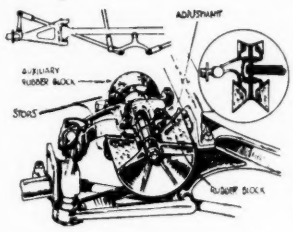


Fig. 14

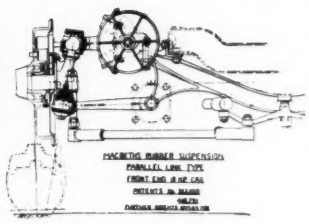


Fig. 15

Fig. 16

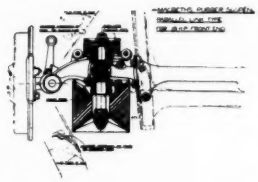


Fig. 17

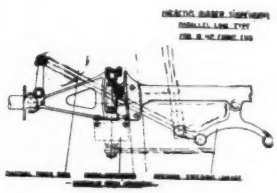


Fig. 18

Figure 15 shows a design to suit a conventional popular chassis without changes beyond discarding standard front axle and connections to it. This design of short-link parallelogram calls for only six lubricated joints for each wheel connection, compared with ten commonly used. The top spherical joint of the king pin takes the bulk of the static and moving load, the top ball-end of the stub axle fitting into a "cup" end of self-lubricating metal. Above the cup is an oil reservoir from which the cup is fed by percolation, at an increasing rate in the case of any temperature rise. Other designs and method of lubrication are feasible, but the arrangement shown insures that lubricant injection need only be very occasional.

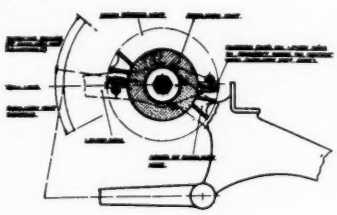


Fig. 19

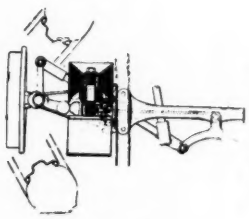


Fig. 20

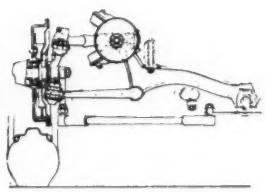
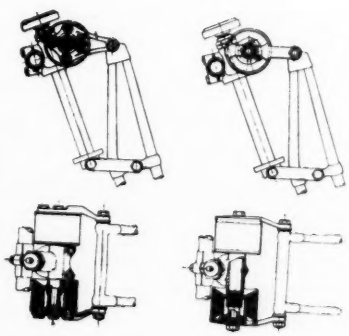


Fig. 21

Other torque loaded parallel link suspensions have the torque resistant member connected to the bottom arm and, when using spherical king-pin connections, take the vertical load on the upper face of the lower ball, thus restricting the load carrying capacity of a given diameter of ball end.

The lower link bearing shown is used mainly to locate the wheel and take lateral and braking leads. It is arranged



1 2

Fig. 22

with an internal oil reservoir, and its cup-like form insures oil retention. It should be noted that the top and bottom links are made from identical forgings, which in machining become right and left handed.

Wheel Control as Regards Correct Tracking and Camber Variations

Figure 16 shows by comparison actual wheel track and camber changes when controlled by linkage of the design shown on Figure 15 as compared with variations on a rigid conventional axle of the same track width. It will be noted that in cases where one wheel is deflected vertically, the camber change variations are all much in favor of the independent suspension system. The lever lengths would be better if slightly longer than shown.

Extreme axle movements are cushioned on bonded rubber stops in both directions, and such loads are not transmitted through any splined or other connections, but come mainly upon the generous king-pin bearing and are easily resisted by the comparatively short and stubby top lever arm.

Torque Loaded Spring

Figure 17 shows that this is so splined to the center spindle and bolted to the top arm that the spring is not subject to any eccentric loading. Needle bearings are used for the arm itself and fore-and-aft load due to braking and acceleration is taken by the rubber unit which thus becomes an end thrust bearing and cushion.

Provision for Shock Absorption

While it is now generally recognized that rubber is the sole known substance which is appreciably self shock absorbing due to hysteresis losses, provision is made for the use of any suitable oscillating hydraulic or other type of shock absorber, as in Figure 18 showing its attachment to the axis of the bottom link. The shock absorber body oscillates; its lever is anchored to any conventional point on the axle unit or frame, or the two lever arms may be combined as shown, as a cross tie-bar spanning the off and near units.

Needle Bearing Usage

The design incorporates needle bearings at the axes of both links and also for the center steering connection. Such bearings are now accepted as satisfactory for oscillating units and can be permanently packed or may be fitted with lubricating connections. Their capacity for end loads is ample.

Progressive Springing

The opinions of automobile engineers differ as to the desirability of arranging that spring suspensions shall have a low rate (in pounds per inch of deflection) at light loads and a higher rate when heavily loaded or when deflected above the normal position owing to irregular road surfaces.

Demands may be met by the use of an auxiliary torque loaded unit, which is undistorted on light loads and only acts on loads exceeding the normal one-passenger static load or above such other load as may be desired. Such provision is there in lieu of or in addition to the limit stops shown. The auxiliary spring, as shown in Figure 19 comes into play when the radial arms contact with oscillating faces on the top lever arm; rubber faces are fitted merely to insure silent contact. The percentage of stiffening and the point at which it commences may be as required by the suitable proportioning of the auxiliary spring units.

The auxiliary springs may be arranged to act in both directions, and when so arranged, they are also fitted in undistorted condition and stiffen the spring on each side of the normal loading figure. Such double acting auxiliaries are free from mechanical bearing friction, and when suitably proportioned, their effect as regards spring stiffening is not appreciable unless substantially oscillated from the neutral or undistorted condition.

It should be realized that all the rubber torque units shown and tested give a static load deflection line on the "bound" which is very similar to that of a well-lubricated steel spring. On the rebound, however, there is a great difference. This feature is a major reason for persisting with their development; others are that such springs do not vary in use, whereas all motorists realize that conventional leaf springs deteriorate rapidly from the "new car" condition.

In dealing with these later designs of lever arm suspensions at length, the author realizes that with the extending adoption of independent suspensions of one type and another comes the opportunity to use *torque loaded rubber springs* and also contends their effective application, simplifies the job of chassis design, reduces the cost of parts, and makes possible the combination of wheel suspension gear, steering linkages, motor units, mudwings, etc., into a snugger, more effective, and more economic unit than when using laminated, coiled, or steel torque bar types of springs.

Further experience in the development of units applicable to conventional chassis has resulted in the design in Figure 20, revealing the use of two rubber units arranged fore-and-aft of the top link member which allows increased wheel lock. In Figure 21 is shown an elevation of this design.

Steering Control

The various front-end designs make use of center point steering by an "L" lever pivoted at a point ahead of the wheel centers. This position was felt to be a desirable objective as it makes possible the forward placing of the motor without having to interfere with the desirable oil sump shape.

Such a steering linkage layout provides an almost faultless control of both wheels on both locks. It has been argued that there is no need to be too exacting as regards conforming to true Ackermann principles. In developing these designs, however, perfection has been aimed at, and it has been found that the arrangements, viz: center point front mounted "L" lever, diagonal track rods, and rearward steering arms, provide an Ackermann-type linkage having a toggle action such as provides a "dwell" in the movement of the outer wheel track rod and a "speed up" in that of the inner wheel track rod. Such linkage at all times maintains ample leverage on the steering wheels. In straight running on extreme wheel deflection the maximum inaccuracy is ½°. Under full locking conditions the wheels remain within 1¼° of perfect alinement, and this inaccuracy is almost zero on full deflections.

It is a happy coincidence that the lateral displacement of the steering lever pin (due to camber changes on bound and rebound) agrees very closely with the arc described by the track rod outer end. The use of the diagonal trailing track rods is a feature not easily applicable to suspensions employing either vertical coiled compression springs or laminated cross springs in the well-known manner. Their introduction provides eight inches of ground clearance, when using super-balloon tires on 16-inch rims, and great freedom in the choice of fore-and-aft position of the motor unit.

(*Continued on page* 51)

Patent Abstracts

Continuous Processes and Latex Application

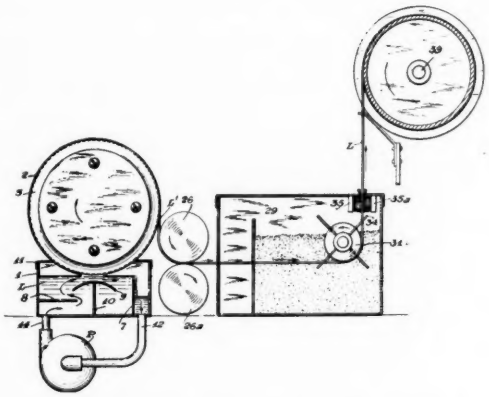


Fig. 1. Device to Produce Elastic Rubber Thread

RECENT patents have been accumulated, selected, and classified by subjects considered to be of particular interest to groups of our readers. You will find below the salient points in some patents covering processes and machines regarding two activities which are not necessarily related, but which by nature lend themselves to very close consideration.

Wire and thread are typical products applicable to continuous processes and machines. Likewise, latex can be easily applied to coiled or spooled articles drawn continuously through the bath of latex. It is hoped that the association of ideas gained from the patents abstracted below may be helpful even beyond the individual scope of each patent.

Latex Concentration System

A novel method or system of concentrating latex continuously is provided in a recent patent[1]. The concentration, according to this invention, is effected by centrifuging a mixture of evaporated, and thus concentrated, skimmed latex and whole latex. A cream with a high percentage of rubber and a decreased percentage of the serum constituents is thereby produced. The skimmed latex, produced at the same time as the cream, is passed through an evaporator where it is concentrated into the latex serum which is mixed with whole latex before centrifuging. Thus in a system comprising an evaporator and a separator, concentrated skimmed latex is circulating in which the contents of the dry material of this latex is increasing. At a suitable concentration, part of the concentrated serum is removed and treated separately. By mixing concentrated serum and latex the separation is facilitated as the specific weight of the solution from which rubber is separated is increased.

Latex Rubber Thread

A method and mechanism, simple, convenient, and cheap to operate, have been devised for producing elastic rubber thread on a large scale of uniform quality, shape, and cross-section.[2] As indicated in Figure 1, latex, L, is located in a tank or container 1, above which a roller, 2, is mounted in bearings suitably secured to the base of the machine. The bearings are integral with the base so as to form a general frame for the machine. The roller is provided with an enlargement, 5, the periphery of which is formed with a groove. The grooved portion dips into latex, L, only so far that the edges of the groove contact the latex so that an annulus of latex is picked up by it. The roller may be made of any suitable metal not attacked by the ammonia or other ingredients present in the latex. Having high heat conductivity, the roller can be readily heated electrically for the purpose of coagulating and drying the latex picked up in the groove.

The tank is divided into compartments by baffles, 7, 8, 9, and 10; also it has a cover, 11. A pump, P, is connected with the tank by pipes, 12 and 14, for continuously circulating the latex, and it can also be used for maintaining the level of the latex.

The latex adhering to the surface of the groove of the roller, 2, is carried up and away from the container, 1, and is dried and coagulated by the heat supplied to the roller, 2. After passing through an arc of about 270 degrees the completely coagulated latex is stripped from the groove in member 5 and is caused to pass between a pair of rolls, 26 and 26a. Both rolls can be positively driven so that they will turn at the same speed in unison. The latex L in the tank, I, may be mixed with vulcanizing material and suitable accelerators so that it will be vulcanized when it has moved to the point marked L^1, thus making it easy to remove from the groove. The rolls, 26 and 26a, produce enough tension positively and uniformly to accomplish this removal of the rubber thread, which is then drawn into the closed dusting chamber 29, passing through a body of loose dust under a grooved pulley 31. Excess dust is removed from the thread as it passes between brushes, 35 and 35a, on its way out of the chamber to a magazine spool, 39, upon which it is wound in superimposed layers in the same manner that cotton thread is wound on a spool.

Continuous Insulation and Vulcanization of Wire

Rubber insulation is extruded upon preheated wire, and vulcanization of the rubber composition is effected con-

[1] U. S. patent No. 2,044,626, June 16, 1936.
[2] U. S. patent No. 2,037,031, Apr. 14, 1936.

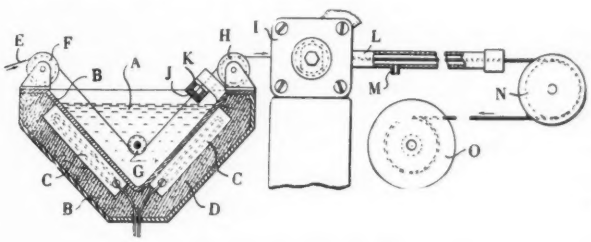


Fig. 2. Means of Coating and Curing Wire

tinuously by heat conducted from the hot wire, supplemented, when necessary, by heat received externally while passing through a steam-heated chamber[3] simultaneously preheating the wire and coating its surface with metallic or nonmetallic materials insures an intimate bond between the wire and the rubber covering. As shown in Figure 2, the wire is preheated by passing it through a heated liquid bath, A, contained in a container, B, and maintained at a predetermined temperature by electrical heating elements, C, embedded within insulating material, D, in a lower compartment of the container. The heating element may be connected to any suitable source of electrical energy. The wire, E, passes over grooved rollers or sheaves, F, G, and H, which guide it through the liquid bath, A, and then into the insulating head, I. Upon emerging from the liquid bath and before entering the insulating head the wire may be passed through a die or wiper, J, mounted in a bracket, K, attached to the container. The heat retained by the wire from the liquid bath will tend to vulcanize the rubber insulation.

When a relatively thick covering of rubber compound is applied on the wire, the heat conducted from the preheated wire may be sufficient to vulcanize only the layer or portion of the rubber compound immediately adjacent to the wire. In such instances the covered wire may be passed through an auxiliary vulcanizing chamber, L, wherein steam or any other suitable heating medium is admitted through an inlet, M, the heating medium in the chamber being maintained at a predetermined temperature and under a predetermined pressure, as may be required to complete the vulcanization of the rubber covering. The vulcanized insulated wire is drawn from the steam curing chamber over the pulley, N, to the winding up reel, O.

Continuous Process Vulcanizer [4]

This machine is designed to be of inexpensive construction with a minimum number of wearing parts suitable to insure uniform vulcanizing of any of a variety of sizes and shapes of goods of continuous form. The principal feature of the method consists in vulcanizing the goods by passing the product through sealed chambers subject to variable pressures and through separately controllable heat zones arranged in the chambers.

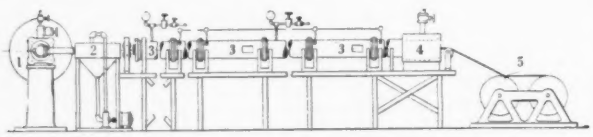


Fig. 3. Continuous Vulcanizer

Assuming insulated wire as an example the wire to be rubber covered (see Figure 3) passes through the extruder, 1, which forms the rubber in a uniform coating, to the lubricator, 2, where is applied soapstone, soap, or other lubricant to enable the rubber to slip through the orifice and then through the vulcanizer, 3. The latter is in the form of a tubular casing of any desired cross-section, preferably cylindrical. It is formed of a number of separable sections, each provided with flange rings at the end which are suitably bolted together. The temperature may be varied in the different sections to afford desired vulcanization. Any pressure above atmospheric will serve to prevent bubbling or porosity in the rubber.

[3] U. S. patent No. 2,013,404, Sept. 3, 1935.
[4] U. S. patent No. 2,023,665, Dec. 10, 1935.
[5] U. S. patent No. 2,047,736, July 14, 1936.

At each end of the vulcanizing casing and secured to the end flange rings is a plate which closes the end of the casing. This plate is formed with a central orifice which corresponds closely to the sectional shape of the article to be vulcanized. Within the tubular vulcanizer are arranged a number of heat elements, one for each section, with electric supply connection.

At the outlet end of the vulcanizer the cured wire enters a water cooled chamber, 4, previous to being reeled up at the capstan, 5.

High Speed Coating and Curing of Drop Wire [5]

The compound made after the formula given below is employed as a wire coating applied and cured in the apparatus indicated in Figure 4. Not only is the core centralized with respect to the covering, but the covering possesses superior mechanical and electrical properties. As a result of the exceedingly rapid vulcanization, the rubber compound does not deteriorate to the extent that a similar compound does when subjected to a slow vulcanizing process. Furthermore, the expense of handling, reeling, etc., inherent in pan vulcanizing methods, is eliminated. The process is continuous and may be carried on at a high rate of speed limited practically only by the rate at which satisfactory extrusion is possible. For example, in coating No. 17 B. & S. gage drop wire with a coating $^{3}/_{64}$-inch thick, satisfactory results are obtained when the speed of travel of the wire is from 400 to 500 feet per minute. Since these results were obtained when using a vulcanizing chamber 100 feet in length, the corresponding vulcanizing periods for these speeds would be 12 to 15 seconds. Such a period of vulcanization is exceedingly small when compared with the vulcanizing periods used heretofore for the vulcanization of insulating compounds on electrical conductors.

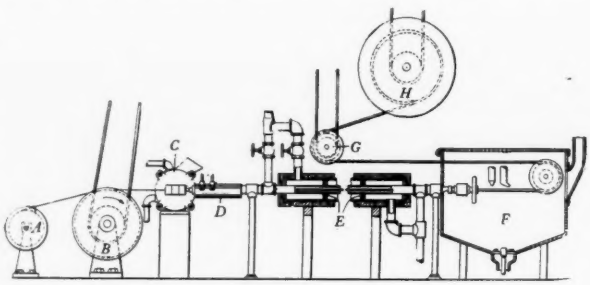


Fig. 4. Apparatus for Coating and Curing Drop Wire

The rubber compound extruded about the wire is carefully compounded to meet the exacting requirements of a continuous vulcanization process when carried on at high speeds. The preferred compound consists of the following ingredients in substantially the proportions named:

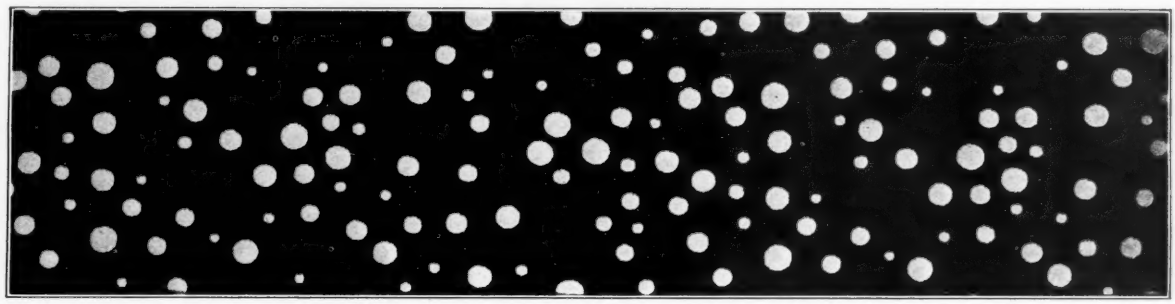
	%
Smoked sheet rubber	22
Reclaimed rubber (boot and shoe)	10
Reclaimed rubber (whole tire)	10
Mineral rubber	5
Whiting	44.7
Zinc oxide	2.5
Antioxidant	1.5
Sulphur	1.0
Softener (pine tar oil)	3.0
Ultra-accelerator	0.3

In preparing this compound all the materials except the ultra-accelerator are masticated in a commercial-type mixer and put through a strainer. The compound is then allowed to cool approximately ¾-hour instead of aging 48 hours as is customary. The ultra-accelerator is then

(*Continued on page* 51)

Application of Compounded Rubber Latex to Textile Printing[1]

Charles S. Powell[2]



THE photograph shows white discharge printing on silk originally white, but which had been completely dyed black before printing. Latex is used as a binder in the white discharge paste which is printed on one side of the fabric. During a steaming operation the discharge paste removes the black dye and penetrates through to the reverse side, resulting in the white impregnation of the fabric so as to produce the identical white design on both sides. Latex prevents bleeding, binds the pigment in the fabric, and makes possible the soft flexible finish which likewise acts as a protective against wear and solvents.

DURING the past few years latex has found many uses in the textile industry for the coating, backing, and impregnating of napped cloth, pile fabrics, and felt. Latex is also used as a binder in the production of artificial suede and artificial velvet.[3]

Recently the value of latex in textile printing has also been recognized. Latex is easily incorporated in printing pastes and by its use not only may the quality of the product be improved, but novel effects may be secured. However in order to secure satisfactory results the latex used for such a purpose must be carefully compounded with particular attention paid to the choice of thickeners, wetting agents, vulcanizing ingredients. In addition the latex must be sufficiently stable to withstand the printing process without coagulation. In this article, the various applications of latex in textile printing will be briefly outlined without attempting to give specific instructions for compounding the latex mixes actually used.

Discharge Printing

Among other ingredients a discharge printing paste usually contains a binder to hold the pigment in the cloth and prevent the bleaching agents from bleeding into the surrounding fabric. Water-soluble gums are sometimes used for this purpose; but egg albumen or a light-grade of blood albumen is also a suitable binder.

However these latter materials, when dried on the cloth, have the disadvantage of being stiff and brittle so that when the cloth is put through the "button-breaker" to soften it, the pigment and binder show a tendency to flake off in a fine dust. Properly compounded rubber latex, when used to replace egg albumen produces a softer feel to the finished cloth, eliminates flaking, and, when a pure white discharge is desired, gives a better color.

Pigment Printing

Under certain circumstances where vat dyes are used to obtain certain colors, it is not possible properly to discharge the cloth; while with very sheer fabrics little contrast would be obtained by discharge printing. In these cases it is necessary to resort to pigment printing in order to get a lighter color on the printed area. Titanium dioxide and zinc oxide are both suitable for pigment printing. The binder used with these pigments must meet certain requirements. It must not wash out during the finishing operations, must have good adhesion, and must not make the cloth stiff and harsh. Latex is particularly suitable for pigment printing because the dried film of rubber deposited is little affected by soap and water and is also very flexible. Again care must be taken to vulcanize the rubber properly and also to choose those curing ingredients which will have the least effect on the color of the finished cloth. Stabilizers and gums may be added to improve processing as long as they do not seriously impair the water resistance of the rubber film.

Flock Printing

The binder used in flock printing may be applied either by ordinary engraved printing rolls, or by means of a knife spreader operating in conjunction with a perforated

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[1] Reprinted from *Rayon Textile Monthly*, Feb., 1937, p. 78.
[2] Revertex Corp. of America, 80 Broad St., New York, N. Y.
[3] B. A. Harold, *Amer. Dyestuff Rep.* 25, No. 5, 111, (1936). "Latex in Industry," R. J. Noble, 1936,

continuous metal belt. In either case after the binder is applied to the cloth the fabric is immediately passed into a flocking chamber where the flock is applied by means of revolving metal screens, while, at the same time, the cloth is beaten from underneath by means of an hexagonal beater. For this purpose latex is quite suitable, as no inflammable solvents are necessary and a flocked fabric results which has good aging qualities. The mix used is merely latex plus "curing ingredients" compounded so as to have the proper viscosity. This viscosity plays an important part in producing satisfactory material as, if the latex mix is too thin, an insufficient amount is applied to the cloth with the printing rolls; while, if it is too thick, the flock is not properly anchored in the rubber. It has been found that the base fabric used must be rather closely woven to obtain the best results in order to prevent complete penetration by the latex.

In closing, it should be pointed out that in these processes often each fabric presents a different problem with respect to the proper choice of wetting agents, thickeners, etc. In addition the operating conditions in different plants vary, and a mix which works on one printing press satisfactorily may require a minor adjustment to operate satisfactorily in another plant. However once the proper mix has been developed, there should be no further trouble from non-uniformity of the product.

A Reader's Comment on Rubber Restriction

A LETTER dated February 22, 1937, and addressed to the Editor, INDIA RUBBER WORLD, has been received from F. J. Tompsett, chairman of Rubber Shareholders' Association, in England. The letter is self-explanatory and is reproduced in full below.

"DEAR SIR,

"The attention of my Committee has been drawn to what they consider to be a very unjust and unmerited attack, made by you upon the International Rubber Regulation Committee in your last issue and they trust that in all fairness you will be so good as to publish their views on the matter.

"It may be admitted that the constitution of the Committee is not all that it might be, as it should be representative of every section of the industry, including shareholders of producer companies, the Rubber Trade Association and the consumers. At present it consists solely of representatives of the various Governments concerned and a few leading Agency Houses, but doubtless its constitution will be amended when and if the renewal of the Scheme comes up for discussion. Whatever, however, may be its shortcomings, it has always done its best to act fairly as between producers and consumers, and in this connection it is well to bear in mind that producers mainly are not mass producers and that consumers are not synonymous with tyre manufacturers, neither are the interests of both in each case identical.

"There have been occasions when this Association has regarded decisions of the Control Committee as favoring the consumers at the expense of the producers, but time has shown that on the whole they have acted with wisdom and discretion and they are not to blame for the position which now exists and the development of which has been foreseen by many for several months past.

"The administration of the Regulation Scheme in an orderly manner has been consistently thwarted by the obstructive buying tactics of the five enormously powerful tyre manufacturers, who have been unwilling to pay what producers consider a fair price and who by a combined policy of hand-to-mouth buying have been endeavouring to force producers to accept the unremunerative price of 8d. per lb. or thereabouts.

"The Control Committee have done their best, from time to time, to meet the requirements of the trade in a reasonable and orderly manner and cannot be held responsible for the falling off in the production of rubber or for the world's increasing need of the commodity.

"There are certain manufacturers who have had the intelligence and foresight to lay in substantial stocks at prices ranging between 8d. and 10d. and for those who have not possessed similar wisdom there can be no sympathy. To sulk in their tents as they are now doing, is an unseemly and puerile attitude, which inspires a sense of amusement, if not derision and certainly does not call for any sympathetic consideration either by the Control Committee, or by consumers at large, who are quite prepared to pay a higher price for rubber, in common with the higher prices that are being paid for all other commodities.

"Releases during 1936 would undoubtedly have been greater, had the manufacturers been willing to pay slightly higher prices and to buy more freely, but even had they done that, it is very doubtful whether the approaching scarcity of rubber could have been materially affected or in any way avoided.

"In conclusion, may I point out that this Association is representative of some 300,000 shareholders, who have invested about £300,000,000 in the Industry and that for many years they have had next to no dividends. To think, therefore, that 8d. per lb. for the product of their industry and enterprise is now adequate, is altogether unreasonable. It does not represent more than the actual average cost, laid down in London, Amsterdam or New York, if full consideration be given to such matters as Amortization, Depreciation and General Reserve for the various incidentals necessitated by the higher standards of living now called for. My Committee considers that for some few years producers are reasonably entitled to 1/- per lb. and it is the fault entirely of tyre manufacturers themselves, should speculators get control of the market for the immediate future. The Control Committee cannot produce rubber like conjurors can produce rabbits out of a hat."

AMONG THE LEADING AUTOMOTIVE EXPORTS FROM THE United States during 1936 are included the following with their respective values: truck and bus casings, $3,991,677; automobile casings, $7,707,098; inner tubes, $1,082,463; solid tires, $180,553; tire sundries and repair materials, $672,590. From Canada tire exports during the year 1936 were valued at $7,342,415.

Lacquers on Rubber Goods

E. I. Oppel [1]

WITH a growing number of lacquer manufacturers capable of understanding the needs and problems of present-day rubber compounding, the use of lacquer on rubber goods has risen to a point where lacquer coated products now are penetrating markets formerly considered impregnable. To the rubber manufacturer, particularly the manufacturer of mechanicals and novelties, this more extensive use of lacquer holds great promise for the future. In spite of the fact that no universal rubber lacquer is yet available, there is today a greater number of rubber products which can benefit from the application of lacquer coating recently developed than ever before.

Since 1933 advances have occurred in lacquer formulation that are little short of revolutionary. There is really a tremendous interest in those lacquer coatings which will not only stretch more than double their length without rupture of the film, but will withstand abnormal flexing and twisting as well. Such characteristics as checking and "alligatoring" have been actually turned to advantage in modifying texture and enhancing mar-proofness. Nearly every gradation in finish is available, and discoloration has been reduced to a minimum.

While no responsible lacquer manufacturer would advance the claim that all the older obstacles have been surmounted, such problems as adhesion and distensibility have received really intelligent treatment, and due credit for these advances should be attributed to intelligent cooperation between rubber and lacquer manufacturers.

Improvement in Sales Appeal

The number of uses, some unique, to which lacquer coating for rubber can be put is large. Utilized in a purely decorative fashion, lacquer is an extremely important means of adding "dressiness," luster, and sparkle, color—in short, sales appeal—to articles which might otherwise remain commonplace and drab. That this can be a matter of timeliness is best illustrated by recent toys and novelties. Merchandisers have learned that the success of a new gadget is not purely a matter of what shape or form it takes, but how it is dressed, how it meets the vogue for current color modes.

No amount of resourcefulness in compounding practice will enable the manufacturer to change from color to color, shade to shade as easily as will lacquer. Nor can he otherwise shift from matte to glossy effects or intermediate gradations with all the flexibility that lacquer permits.

Not quite so obvious, but equally important from a sales standpoint, are several other less tangible qualities which lacquer coating will impart to rubber articles. Surfaces may be made highly mar- and mark-resistant with the lacquers recently available. This point is of paramount importance in many rubberized fabrics which, unlacquered, frequently lose their original freshness after preliminary handling.

But perhaps a more important sales point than the resistance of rubber to marking is its "feel." From a practical standpoint this is intimately related to the former property. Not only does a tacky surface mar more easily, but it is equally unpleasant to touch. It is not surprising that many people, women in particular, have an aversion to this quality, for it is apt to vary widely with changes in climatic conditions and temperatures. Moreover unlacquered rubber picks up dust, lint, etc., hard to remove. Purely as a matter of expediency, it is desirable to combat the latter trouble alone. Curiously enough, it has been one of the most difficult problems to add such a smooth, non-tacky, or dry surface to a lacquer film without detracting from its other inherent, valuable properties. It is only in recent years that such lacquers have become available.

Protective Qualities

Although the enhancement of sales appeal is an important advantage of lacquer coatings, they have other functions which are steadily increasing in significance in the eyes of rubber manufacturers. For example, when cable manufacturers found it necessary to meet the more rigid requirements introduced with high compression motors and high voltages, lacquer became one of the most important adjuncts to producing a satisfactory product.

Consider for a moment some of the agencies which attack rubber—oxidation, sunlight, oil and grease, gasoline, water, heat, corona, and even ordinary dirt. With a few exceptions, nearly every deleterious influence in this list is present in almost all cable applications. Yet through the medium of the protective lacquer coating rubber cables are successfully challenging these in every-day service.

Conceive of an ordinary rubber gasket such as might be used around the cap for an automobile gas tank. Subject to frequent wetting with gasoline, rigorous outdoor exposure as well as frequent manual manipulation, a satisfactory product has been achieved only through the use of one of the new lacquers now on the market.

There is certainly an increasing amount of rubber being used in automobiles today. The host of grommets, moldings, mountings, washers, and gaskets now used indicates that the trend toward noise insulation and cushioning is one of growing importance. Refrigerator and aircraft moldings and fittings add to the total. Unquestionably, a number of these products offers a fertile field for utilization of the protective lacquer coating.

Some idea of the possibilities of lacquer coatings for rubber composition may be gained from the foregoing. But, between the utilization of lacquers and the realization of their potential advantages is a wide gulf which can only be bridged by intensive and intelligent effort. Given the finest lacquer available, the rubber manufacturer can only add to his problems unless a close analysis of the methods of handling and efficient application is made.

Conditions of Application

It is not to be supposed that application is a subject about which broad generalizations may be made. Yet

[1] With U. S. Industrial Alcohol Co., 60 E. 42nd St., New York, N. Y.

not infrequently approaching this with a casualness unwarranted, the rubber manufacturer finds it easy to place the blame on his lacquer when satisfactory results are not forthcoming.

Convenient as an example is the manufacture of lacquer coated cable. Stripped of all its details, this is essentially an operation of feeding a cable through a bath of lacquer, mechanically removing the excess lacquer, and then drying. Actually this is one of the most complex procedures if all the possibilities for failure are taken into account. To begin with, it is not unusual to apply as many as ten or even more than twenty coats of lacquer to obtain the precise coating necessary for this work. Even under ordinary variations of temperature and humidity the thickness of these coatings may vary four or five fold despite the mechanical removal of the excess lacquer, for the viscosity of the lacquer changes with accelerated evaporation of the solvent used. Moreover the speed and evenness of travel of the wire through the bath introduces other variations in drying.

The thickness of a single coating of lacquer under the conditions outlined has been variously placed at from five to fifteen mils. This film is far thinner than coating films used in other rubber work. Its ability to withstand without cracking the common flexure test around a one-half-inch mandrel after exposure to a hot oil bath at temperatures above the boiling point of water is dependent not only upon the character of the lacquer plasticizers used, but upon the evenness of film thickness as well. The stresses which may be set up in a film of uneven thickness are of such magnitude that focal points of weakness are quickly established.

The selectivity of the cambric covering as well as rubber for moisture is a highly variable factor with fluctuations in humidity. Likewise do the wetting properties of the lacquer change with differences in surface tension induced by moisture. Apart from the inherent wetting qualities of the lacquer it appears advisable to promote drying at higher temperatures, provided humidity is kept low, since surface tension and adhesion of the coating remain more constant.

The requirements for a low-tension cable coating are, of course, much less severe than for high-tension work. Provided flexibility to mandrel test is good at ordinary temperatures, not much more is needed beyond adaptability to reeling without sticking of the wire. The high-tension type, however, should not only undergo the bath test at elevated temperatures, but withstand corona at 50,000 volts and be self-extinguishing when ignited. It is remarkable that nitrocellulose lacquer meets such tests without having the plasticizers decomposed or driven off.

Effect on Final Cost

While lacquers have grown to be recognized as indispensable to cable manufacture, it may be shown that there are other applications where cost is not the barrier it is thought to be at first glance. For this must be considered as related to cost of the rubber stock itself as well as balanced against the advantages to be gained.

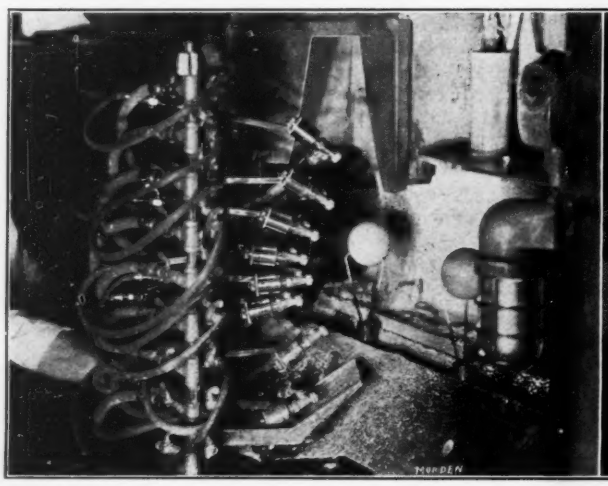
Formulation of a red, hot water bottle stock allows for a choice in red pigment. Between the use of Spanish red, C.P. red oxide, or a more expensive organic pigment, there is a not inconsiderable variation in basic composition cost. Yet a clear lacquer will impart a brilliance to the cheapest stock, not to mention the masking of surface imperfections and blemishes. Besides the improved age resistance of the lacquered bottle should be considered. Balanced against synthetic antioxidants, age resisters, and waxes which might be used, closer calculation of costs will often show no great disparity.

Another example is provided by the doll stock which faces highly competitive markets. The drab appearance of the product molded from rubber scrap receives an immeasurable transformation by the application of colored lacquer. It might be interesting to calculate the cost of a stock compounded with crepe and colored pigment provided the same effect could be obtained.

Definite economy in the use of lacquer can be effected by careful consideration of the methods of application: dipping, brushing, spraying, or spreading.

Methods of Application

Dipping by hand is, of course, an expensive operation compared with machine dipping if fairly large production schedules must be met. It is, furthermore, a questionable procedure from the standpoint of obtaining best results, since unlike the mechanized operation, it does not always produce an even coating due to the variation in run-off. Automatic vertical or rotary dipping permits control of the thickness of the coating to a close degree. In general, small molded articles having fairly simple shapes, for example, children's alphabet blocks, etc., are best finished by



Pennsylvania Rubber Co. of America, Inc.

Automatic Lacquer Spraying of Play Balls

Color Striping with Lacquer for Decorative Purposes

dipping. Where angularities and more complicated structural features are present, spraying is better adapted to prevent filling, run-backs, etc. An example of this is the doll heads and the more unusual toy soldiers. A combination of processes is often used as in the manufacture of dolls with the body parts conveniently finished by dipping since these present surfaces which are relatively simple.

The choice between manual and automatic spraying must often be made in the interest of maximum economy. Yet apart from this the automatic operation is often a means of providing a more perfect coating. With the latest units having automatic cut-offs, the closest regulation of film thickness and color differences may be had. Rubber matting, some of the larger footwear, golf balls, and certain kinds of sheeting offer an interesting field for the automatic operation. Unlike machine dipping, automatic spraying lends itself to many small production schedules.

Spreading is best adapted to coating rubberized fabrics and proofing. With a fast drying lacquer the movement directly from the calender to the doctor blade or spreader and then to the wind-up can be made a rapid operation with no risk of sticking. Where thicker films are desired, selection of a more highly plasticized lacquer must be made. Roller coating, such as is used in applying lacquers to paper and textiles, has not received widest application. However its greater use in the future will be closely watched.

Although there is often a choice between the application of a lacquer before or after cure, particularly for mechanicals, this choice should only be made after due consideration of the behavior of the stock upon vulcanization. While in general the gain in adhesion is sharp when the lacquer is applied to the uncured stock and then vulcanized in air under pressure, any such gains may be offset by surface imperfections arising from blooming and poor wetting.

Effect of Compounding Ingredients

High stearic acid or hydrogenated fats, degras, and various coaltar softeners are apt to be troublesome with respect to blooming. Sulphur bloom very often gives a surface not evenly wet by lacquer. Palm oil may introduce excess moisture which will cause blushing or produce lifting and pitting of the film.

It may be possible to reduce blooming from the softener by using only sufficient stearic acid to react with the accelerator, replacing the balance with some other softener which has merely a lubricating effect. Where antioxidants are used to retard flex cracking or reversion, these must in general be kept below 1.5% to inhibit blooming from this source. If it is not possible to reduce blooming to reasonable proportions, the lacquer should be applied after cure to the clean rubber surface for best results.

The type of accelerator is another factor which must be taken into account if the lacquer is to be applied before cure. With the more scorchy quanidines, cure discoloration of the lighter tinted lacquers may be experienced. High sulphur accelerators should be watched for signs of blooming. Secondary accelerators which have a delayed action at low temperatures may give trouble with respect to embrittlement of the lacquer film.

It cannot be too well emphasized that a lacquer which works satisfactorily on one rubber stock cannot be applied to another recipe with impunity. It is a peculiar characteristic of rubber lacquers that those adapted to a given compound may well be an outright failure when applied to another.

Custom-made Lacquers

The present trend is definitely toward custom-made lacquers; that is, the lacquer is made to suit the particular requirements of a rubber stock. It is an encouraging sign that present-day lacquer manufacturers have provided a wider variety of such products than ever before. With their cooperation and the exercise of reasonable care in application, lacquers can be extremely important tools in the rubber industry.

Patent Abstracts

(*Continued from page* 46)

added in the warming rolls with just sufficient working to mix it thoroughly, and the compound is used as soon thereafter as possible, which should always be within two hours.

The insulating and vulcanizing apparatus indicated in Figure 4 embodies the following principal parts: A, supply reel for wire; B, power operated capstan; C, extruding machine with insulating and outlet dies; D, open section for wire splicing and inspection; E, insulated steam-jacketed vulcanizing section 100 feet long equipped with steam control and steam seal at each end; F, cooling hood equipped with water and air nozzles and drainage outlet; G, power operated capstan; H, take up reel for finished wire.

Independent Spring Suspension

(*Continued from page* 44)

Rubber Springs for Motor Cycle Forks

An example showing the adaptability of rubber torque units to existing fork mountings is shown in Figure 22, this being an application to a conventional motor cycle fork.

It has been proved that such units definitely enable the use of frictional dampers to be dispensed with, thus allowing the use of a springing system at all times ready to traverse good roads without spring throttling, and yet sufficiently damped on rough roads to prevent excessive rebound and steering control interference which commonly results today with insufficient spring damping.

The torque unit design is adaptable to the use of pressings for the metal disks in the interests of cost and weight reduction.

It is obvious that the units can be fitted at alternative axes of the fork linkage, but the preferred position is at the fixed axis of the top link, such a position obviating any interference with fuel tank. The unsprung weight is substantially reduced with these units, and the attachment of the headlamp in "sprung" condition is made easy.

Figure 22, 2, approximates the type on which experience has been gained. This also uses two special top links and a new top bracket and shows the use of pressed steel disks for the spring units.

The author's object has been to demonstrate that these new units have outstanding advantages and that they are generally adaptable to suspension systems.

AMONG THE FEDERAL TAXES LEVIED ON AUTOMOTIVE utilities were those on tires and inner tubes. Figures for the years 1933, 1934, 1935, and 1936 follow: tires, $19,816,533, $20,003,544, $22,660,695, and $31,837,511; inner tubes, $4,019,586, $4,700,534, $5,441,753, $6,404,043.

Editorials

Laboratory Value

WHEN speaking before the Rhode Island Rubber Club last month, Dr. Somerville struck a responsive chord when he emphasized the importance of the modern laboratory and its staff and the consideration to which it is entitled in regard to location, equipment, and general financial support. Today the laboratory is the foundation of the rubber industry. It must be constantly active, discovering and developing new products, processes, and compounding ingredients. The testing of materials and products and the technical control of processes take the guesswork out of the production line. Without the quality products resulting from the cooperative efforts of the laboratory, the sales department would have little to offer, and therefore the laboratory man is entitled to an expenditure ample to keep his equipment up to date and he is entitled to a place for his workshop that is light, clean, and inspiring.

During recent years, many new and beneficial accelerators, antioxidants, plasticisers, pigments, and other ingredients have appeared on the market, thus rendering it positively necessary for the successful rubber goods manufacturer to investigate and carefully select his raw materials. Likewise the advancement in the use of latex and its ramifications has resulted in making available products of such quality and cost as to cause very keen competition.

The time has passed when the laboratory can be regarded as a necessary evil and a questionable expense. The laboratory and its staff merit full-hearted support, if not acclaim.

Industrial Advancement

IN ANY industry the greatest common growth or improvement does not result solely from the efforts of individual companies or organizations, but is largely dependent upon the interchange of ideas between members of that industry. If the proper spirit of mutual advantage is practiced by all members, the industry as a whole will advance. The individual companies will be repaid directly by the ideas received which may be applied to their processes and indirectly by the education and broadening of their employes, thereby enabling those members of the organization to work more intelligently and efficiently.

In an industry similar to the group of rubber goods manufacturers a vast amount of duplicated effort by the various companies is likely to occur if they work absolutely independent. Concerted action will materially reduce the possibility of wasted effort through unsuccessful experiments that may have been tried by others. Unprotected processes or equipment need not be divulged in minute detail, but oftentimes the results can be indicated without detracting from the rightful advantage due the originator.

The interchange of ideas can be made through technical organizations and through the trade magazine whose reason for existence depends upon the service rendered to the industry. Practically all companies desire information and should realize that the extent to which the dissemination of facts and research conclusions is possible depends upon the willingness of the members of the industry to make contributions.

Rubber Regulation

ON PAGE 48 of this issue there is a reproduction of a letter taking exception to the thoughts expressed in the February issue of INDIA RUBBER WORLD.

The name Regulation Committee implies the possession of ample information and the ability to control supply and price in relation to demand. True, it is a big task, but the responsibility for knowing the pulse of the situation and taking necessary corrective steps in ample time must rest on the committee. The preface in the book, "Rubber Producing Companies—1937," issued in January by Mincing Lane Tea & Rubber Share Brokers Association, Ltd., London, states, "thus the first purpose of the Scheme, the reduction of excessive stocks, has been achieved. The second purpose, which follows from the success of the first, is the raising of the price to a remunerative level, and this also has been realized."

This statement indicates that the committee started the agencies to accomplish its aims, and present conditions indicate that they could not stop those agencies. A trend must be watched closely. That the situation is now out of hand, presumably owing to an excess reduction of world stocks, is attested by the fact that between November, 1936, and this date the allowable exports have been increased from 65 to 90% (90% being allowable as of July 1, 1937) of the basic quota when it is generally believed that on the average not more than 80% can be produced for some time to come.

EDITOR

What the Rubber Chemists Are Doing

A. C. S. Rubber Division Activities

Spring Meeting

THE spring meeting of the Rubber Division, American Chemical Society, will be held at the University of North Carolina, Chapel Hill, N. C., with headquarters at the University Library, on April 14 and 15, as a part of the general program of the ninety-third meeting of the society which will convene from April 12 to 15.

At the meeting of the Rubber Division papers will be presented at sessions from 2 to 4:45 p.m. on Wednesday, April 14, and from 9 to 11:45 a.m. on Thursday, April 15. From 11:45 to 12:00 noon on Thursday will be a business meeting, and the executive committee will meet from 12:00 to 12:15 p.m. The report of the crude rubber committee will be given by Harold Gray from 3:05 to 3:50 p.m. on Wednesday. The Rubber Division banquet and entertainment will be held Wednesday evening at the Chapel Hill Country Club.

The papers committee, with A. R. Kemp as chairman, has arranged a very fine selection of six papers during the Wednesday session and seven papers on Thursday. Allotted time for each is 10 or 15 minutes with short discussions to follow. Abstracts of these papers are given below in the same order as they are scheduled for presentation.

Abstracts

Frosting of Vulcanized Rubber. Frosting is a descriptive term for a particular type of dulling of the surface of vulcanized rubber articles which occurs most frequently in warm, humid weather. Rubber vulcanized in a mold, in steam, or in air will frost, but the effect is most noticeable on the bright finish of air cured products. Frosting is a microscopic disintegration of the surface caused by ozone in the air, and its action on the rubber is favored by warmth and humidity. Frosting can readily be reproduced in a laboratory test. It is prevented by protective films as lacquer or varnish; by treatment after vulcanization with chlorine or bromine or sulphur monochloride; or by incorporating in the rubber before vulcanization certain types of high melting petroleum waxes or one of the anti-frosting agents of which p,p'-diamino diphenylmethane is the most effective. W. F. Tuley, Naugatuck Chemical.

Effect of Temperature and Mill Roll Opening on the Extrusion Qualities of Rubber. A specially designed laboratory tubing machine is described, which is used as a plastometer for determining the plasticity or extrusion qualities of various samples of smoked sheet rubber milled on the laboratory mill under varying conditions of temperature and mill roll setting, as well as on samples passed through a tubing machine at various temperatures. The procedure used in this plasticity determination is described in detail. The data obtained indicate that the method described accurately determines the relative plasticity or extrusion qualities of rubber.

Within the limits of temperatures studied, the lower the temperature, the softer the rubber becomes. Within the limits of mill roll openings studied, the tighter the mill, the softer the rubber becomes. A. H. Nellen, Lee Tire & Rubber Co.

High-Speed Vulcanization of Rubber. The continuous vulcanizing process now employed by the rubber covered wire industry involves the use of very active accelerators and vulcanizing temperatures considerably above those normally employed by the rubber industry. This paper supplies the need of data on the temperature coefficient of vulcanization velocity and quality of the product obtained at vulcanizing temperatures ranging from 170° to 198° C. It is shown that in calculating vulcanization rates for high temperatures a time correction should be applied to correct for the heating-up period. The average 10° C. temperature coefficient in this temperature range was found to be 2.16. Compounds vulcanized at 170° to 198° C. appear to be at least equal in physical and aging properties to the same rubber compositions vulcanized at 142° C. A. R. Kemp and J. H. Ingmanson, Bell Telephone Laboratories.

Notes of Determination of Free Carbon in Rubber Goods. A survey of the methods proposed for carbon black determination shows that the nitric acid decomposition of the rubber sample is the simplest method and accurate enough for technical purposes. The following improvements upon this method are recommended: decreasing the size of the sample; omitting the preliminary extraction of the sample; using an intermediate wash of acetic acid, acetone, and chloroform between the nitric acid and acetone and chloroform; and correcting the results when clay is present. E. W. Oldham and J. G. Harrison, Jr., Firestone Tire & Rubber Co.

Apparatus for the Evaluation of Rubber and Rubber-like Compositions as Vibration Absorbers. The importance of both static and dynamic tests of materials to be used as vibration absorbers is stressed. A test apparatus is described which yields information on both static and dynamic properties in the form of an autographic record of damped oscillations. The equipment is compact, simple, rugged, and can be used over a range of temperatures. It provides a means of evaluating stocks at intervals during aging or mechanical life tests. Examples of test data are presented to show the evaluation of dynamic hardness, static hardness, dynamic modulus, internal friction, and drift. Felix L. Yerzley, E. I. du Pont de Nemours & Co., Inc.

Colloidal Structure of Rubber in Solution. Measurements are reported of the intensity and depolarization of the light scattered transversely by solutions of purified rubber in various solvents. Viscosity measurements on the same solutions are included. Experimental results are compared with the expectations on the basis of various theories of light scattering. It is shown that the scattering is best explained by assuming in the solution a loose structure of anisotropic scattering units large compared to the wave length of light and similar in nature to the cybotactic groups of a liquid. A method for the determination of the relative molecular weight of rubber in solution by light scattering measurements is compared with the viscosity method of Staudinger and the two methods are found to be consistent. S. D. Gehman and J. E. Field, Goodyear Tire & Rubber Co.

Purified Rubber for Electrical Insulation. This paper presents information on the nature and role of the non-hydrocarbon constituents in latex and plantation rubber with special emphasis on their effect on water absorption and dielectric properties. Rubber from latex after nine centrifuge creamings was found to be ash free and contain 0.056% nitrogen, corresponding to 0.35% protein present as a highly adsorbed layer on the latex particles. It is shown that soluble substances rather than proteins are mainly responsible for the absorption of water by rubber, which is

in accordance with the Williams and Kemp osmotic theory. Various methods for purifying rubber are described, and data on the composition and properties of the products are presented. Rubber purified by heating crepe in ammonia vulcanizes and ages satisfactorily and is shown to have a low moisture absorption and a high degree of dielectric stability in water. A. R. Kemp, Bell Telephone Laboratories.

Unsaturation of Rubber Vulcanized with Nitro Compounds and Benzoyl Peroxide. The unsaturation of rubber vulcanized with nitro compounds and benzoyl peroxide has been studied by means of iodine chloride. Results are given that are somewhat similar to those obtained previously with iodine bromide. The data are at variance with those obtained some years ago by Fisher and Gray and lend additional support to the chemical theory of vulcanization. Calculations have been made of the number of double bonds saturated by the nitro compounds and benzoyl peroxide. A molecule of the latter appears to saturate about one double bond, as sulphur does. The nitro compounds saturate more than one bond, and quantitatively this needs further study. John T. Blake and Philip R. Bruce, Simplex Wire & Cable Co.

Scattering in the near Infra-Red as a Measure of Particle Size and Size Distribution. The present methods of measuring the particle size and size distribution of powders are reviewed, and the need of a new method is shown. Such a method based upon the transmission of suspensions at various wave lengths in the visible and near infrared regions is described. From the shape of the spectral transmission curve obtained, the relative average size and size distribution characteristics of powders can be estimated. D. L. Gamble and C. E. Barnett, New Jersey Zinc Co.

Impact Resilience in the Testing of Channel Black. Resilience of cured-tread type stocks as determined by an impact pendulum has been applied to the testing of channel black of rubber quality. Typical frequency curves are presented.

Resilience is found to be related to the blackness of the black and to the toughness it produces in the uncured stock. These three properties, therefore, agree within the range of rubber channel black as well as over the broader range of black from the soft blacks to the color blacks. Its relation to particle size is illustrated by two other tests which are considered qualitative only. J. H. Fielding, Goodyear Tire & Rubber Co.

Influence of Metallic Oxides on Certain Physical Properties of Neoprene. The use of compounding ingredients is not essential to the conversion of plastic to non-plastic Neoprene, but the addition of suitable materials does affect the properties of both the plastic and the cured Neoprene. In this report data are presented showing the influence of metallic oxides on the stability of uncured Neoprene and on the stress-strain properties, hardness, and water absorption of cured Neoprene. It is shown that proper mixtures are more effective than single oxides. The best compounds for general use contain ZnO and MgO. CaO cannot be substituted for MgO. Mixtures for PbO and MgO or ZnO give compounds which have low modulus and tensile strength, but which, with the proper selection of oxides, possess superior water resistance. Howard W. Starkweather and Herbert W. Walker, E. I. du Pont de Nemours & Co., Inc.

Litharge as Accelerator for Chloroprene Plastic Polymer. Litharge is compared with basic carbonate white lead, zinc oxide and magnesia as accelerator for the chloroprene plastic polymer "DuPrene" Type E in stocks loaded with 100 parts soft carbon black. Basis carbonate white lead behaves similarly to litharge, but is slower in set up. The effect of sulphur, wood rosin, stearic acid, pine tar, and lead oleate on cure, and of certain of these on water-, gasoline- and kerosene-absorption with litharge and with magnesia is discussed. Litharge gives good resistance to gasoline and kerosene; it is particularly effective in conferring low water-absorption. W. J. Clapson, Eagle-Picher Lead Co.

Rebound Pendulum Machine for Determining the Plastic Efficiency of Rubber. A description is given of a machine of the pendulum hammer type for the measurement of the elastic efficiency of soft rubber. A new device for recording the exact rebound height is described, a device which can be made to operate at different magnitudes of work input. A new micrometric arrangement to determine by electric contact the penetration of the pendulum hammer into the rubber is described. A comparison is outlined between rebound results and the results obtained by the ordinary hysteresis curves, when determined at constant work input. George J. Albertoni, Goodyear Tire & Rubber Co.

University of North Carolina—Chapel Hill

America's first state university, conceived in 1776, is located on U.S. Route 15, 47 miles east of Greensboro, N. C., 27 miles west of Raleigh, and 12 miles southeast of Durham. From the Washington-Duke Hotel in Durham, the railroad station is four blocks distant, and the bus station for Chapel Hill is one block away. A. C. S. members spending two days at the meeting are urged to make reservations at the Washington-Duke or the Malbourne Hotel in Durham; while those staying longer may obtain accommodations on the campus at Chapel Hill. Extra bus service will be provided to Chapel Hill, and schedules will be posted. Convention headquarters will be in the University Library, located on South Road, Chapel Hill. The Rubber Division banquet, Wednesday evening, April 14, will be held at Chapel Hill Country Club. Upon registration, a pictorial souvenir showing points of interest and a map of the campus will be distributed.

Chicago Group

ON FEBRUARY 26 the regular monthly meeting of the Chicago Group, Rubber Division, A. C. S., was held in "Ye Olde Town Room" of the Sherman Hotel, with an excellent turnout to hear W. L. Harmon, vice president of the Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill., and formerly assistant manager of the mechanical goods division, Firestone Tire & Rubber Co., Akron, O. He gave a most instructive and interesting talk on the subject, "Business Management through Three Typical Stages of Development with Coordinated Functioning of Interdepartmental Relations." Mr. Harmon gave a treatise in organization, management program, finance, accounting, sales, production, performance standards, standard costs, incentive, budgetary control, and research.

On March 26 the Chicago Group had a capacity crowd at its meeting. During the dinner, which was served at 6:45 in the College Inn, the members enjoyed the complete new floor show, the finest in Chicago.

The speaker of the evening was Dr. A. A. Somerville, vice president of the R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y., who is probably America's best-known rubber technologist. He repeated his talk on "More Pictures than Talk" recently given before the Rhode Island Rubber Club. It consisted of some very convincing remarks as to the value of the laboratory in the rubber industry and the proper consideration which should be given to the maintenance of capable personnel and up-to-date equipment. Dr. Somerville then presented moving pictures of his recent visit in Mexico, which included scenes from a Mexican bull fight.

Los Angeles Group

THE Los Angeles Group, Rubber Division, A.C.S., held its monthly meeting March 2 with another record attendance. The total membership in the group is now 163, and Bob Abbott (C. P. Hall Co.), chairman of membership committee, reported continued progress in obtaining new members. The treasury has also been built up, almost to the point of taxable surplus, and President Kirk Hill promised a dividend in the near future. Cash fines for arriving late, sitting next to another member of your own company, or talking back to the chair, are yielding profitable results.

A "Thiokol" ball at each plate was the preliminary to a discussion of this synthetic rubber by E. L. Wright of the technical division of Thiokol Corp., Yardville, N. J. All members were impressed with the description of Thiokol's beginning, development, manufacture, chief characteristics, and present-day uses.

W. R. Cisney, assistant sales manager of A. Schrader's Son, was then introduced by Al McPherson, of The B. F. Goodrich Co., and a summary of the tire valve industry past, present, and future was covered.

After the recital of "A Newsboy's Soliloquy" by Blair Woolstencroft, a former Glendale newsboy, the group's attention was held by an address from Rev. L. Whitcomb Brougher, Jr., of the First Baptist Church of Glendale. In discussing the subject of "Looking Ahead," he advised each individual in the group to use the same rules to develop character and personality and for building the future that he uses in the chemical laboratory.

The finale of the program was a talking motion picture, "Building the West," presented by George Buccola through the courtesy of Associated American Distributors, Inc.

H. A. Mefford, of the Mefford Chemical Co., contributed a bottle of perfumed toilet water to each of those present. Wally Schwartz, of the L. H. Butcher Co., won the raffle of a pair of field glasses, donated by Al Pickard, of the Braun Corp. The following door prizes given by Martin Breuer, of E. I. du Pont de Nemours & Co., Inc., were sufficient in themselves to make attendance at the meeting attractive. Wm. Barworth won the Sparklett Syphon, Bert Dougherty, of the B. E. Dougherty Co., drew the coffee dripolator, and Group Secretary-Treasurer Carl Stentz, of the E. M. Smith Co., took home the cocktail shaker.

Akron Group

ON MARCH 19 the Akron Group, Rubber Division, A. C. S., held a meeting in the Akron City Club, Akron, O. One hundred seventy-four men sat down to dinner at 7 p. m., and approximately 25 came in later to hear the talk.

Captain E. B. Gray, of United Air Lines, discussed "Behind the Scenes in Air Transportation," and many questions were asked after his address. United Air Lines operate a $3,000,000 fleet of twin-engined planes including ten 12-ton Douglas day-time club transports, each carrying 21 passengers and equipped with 14-cylinder 1,150 h.p. engines, and ten 14-passenger high-speed planes as well as eight sleeper planes.

Modern equipment has been developed to a high degree of mechanical efficiency. Checking and double checking during the actual flight has been made possible by installation of all navigation instruments in duplicate and in some cases in triplicate. Examples of this are: the three pilots, captain, first officer, and the Sperry automatic gyro pilot; three radios, capable of independent operation; two motors, each capable of sustaining the plane in normal flight at 9,000 feet with the plane fully loaded. Domestic airlines in the United States during 1935 flew more than 3,000,000,000 passenger-miles, 8,000,000,000 mail-pound-miles, and 2,000,000,000 express-pound-miles. Figures for 1936 show a decided increase.

At a business meeting of the Akron Group the following officers were elected for the ensuing year: chairman, G. Lloyd Allison; vice chairman, A. E. Warner; secretary-treasurer, H. V. Powers.

New York Group

DR. ERNST A. HAUSER, of the Massachusetts Institute of Technology, and recognized authority, will be the principal speaker at the spring dinner meeting of the New York Group, Rubber Division, A. C. S., to be held at the clubrooms of the Building Trades Employers Association, 2 Park Ave., New York, N. Y., Friday evening, April 2. The dinner is scheduled for 6:30 p. m. Tickets are $2.00 each. Dr. Hauser's address will be on "Colloidal Materials," with special reference to those applying to the rubber industry. In addition there will be other entertainment.

Rhode Island Rubber Club

THE spring meeting and dinner of the Rhode Island Rubber Club was held at the Narragansett Hotel, Providence, R. I., on March 12 with F. E. Rupert, president of the club, presiding and Dr. A. A. Somerville, of R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y., as principal speaker. The meeting was well attended by members and guests, not only from Rhode Island, but from Boston, New York, and other points.

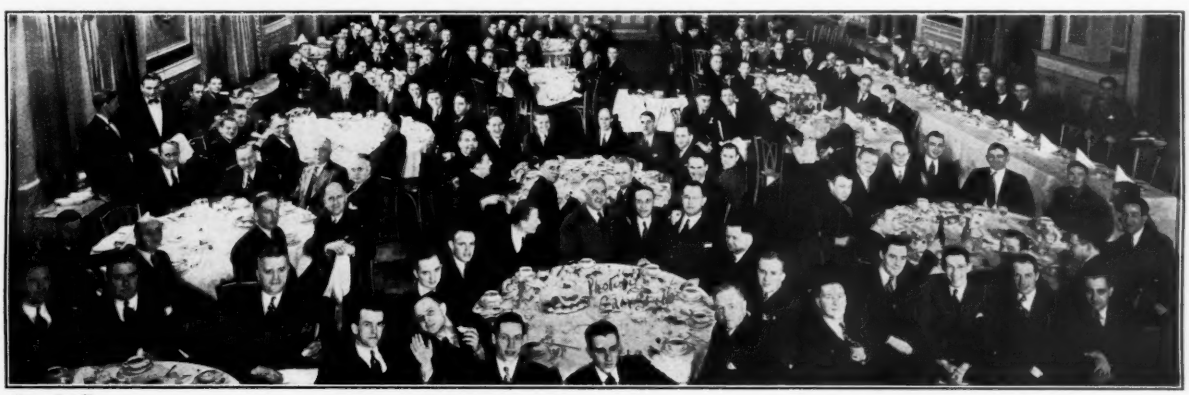
In his address Dr. Somerville made a strong plea for more general recognition of the importance of the laboratory and those who work therein, without stint, to develop and test those ingredients designed to facilitate and improve the processing of rubber. He emphasized the value of the technical service made available to rubber manufacturers by the purveyors of compounding ingredients in conducting primary tests and proving just what their products will do in manufacturers' compounds. Particular stress was laid, by the speaker, on the location and equipment of the laboratory. The time has passed, he said, when a dirty room in a dark corner would serve. The laboratory should have just as clean and well kept quarters as the sales department, for it is the research work which makes it possible to develop items for the sales department to sell.

Dr. Somerville then showed some interesting still photographs taken on his recent tour of Mexico, including views of a rubber factory using about 16 tons of guayule rubber monthly, all taken from guayule plants growing on neighboring arid wastes. He next showed several reels of motion pictures, in color, depicting a bull fight in Mexico City.

Another speaker was Dr. Chas. Wallace Bohrer, of the Toxicology Department of the State Board of Health of Rhode Island, who cited many interesting examples of the manner in which the department co-operates with state and city police in the development of clues and in the solving of crimes of violence by scientific means. Sergeant Uquhart, of the Connecticut State Police, also talked briefly along the same lines.

A. S. T. M. Committee Week

AT the large number of meetings of standing committees of the American Society for Testing Materials, Philadelphia, Pa., held in Chicago at The Palmer House, during Committee Week,



Gray Studio

Among Those Present at the Dinner Meeting of the Rhode Island Rubber Club on March 12

March 1 to 4, many new specifications and tests were approved and will be submitted to the society at the annual meeting in June, subject to approval by confirming letter ballot of the respective committees. There were about 150 meetings throughout the week including main standing committees, sections, and subcommittees. The total registration for Committee Week was about 600. All meetings were very well attended, and spirited discussion took place at several of them on important points.

Committee D-11 on Rubber Products

Officers of Committee D-11 are Chairman, O. M. Hayden, Rubber Chemicals Division, E. I. du Pont de Nemours and Co., Inc., and Secretary, Arthur W. Carpenter, manager of testing laboratories, The B. F. Goodrich Co.

LATEX AND CEMENT. It was decided to undertake work on liquid rubber products, and an organization meeting of a new subcommittee on this subject, under the chairmanship of L. M. Freeman, The B. F. Goodrich Co., was held in Chicago. The subcommittee decided that for the immediate future it would give its attention to the formulation of standard methods for the evaluation of (1) rubber cements and (2) rubber latex. The work on cements will include the standardization of tests for viscosity measurements and for the determination of total solids. A test program was outlined which will require the preparation of samples of different standardized viscosities to be distributed to a group of cooperating laboratories. Determinations will be made of the total solids present and viscosity of the liquid rubber by methods used in each of the laboratories. A study and survey of the test procedures used will be made by the committee. Arrangements have also been made for a cooperative series of tests by various interested laboratories on latex obtained from one source of supply, which will include 60% latex and latex having normal concentration. Tests will include the following: color, total solids, dry rubber content, ammonia, and hydrogen ion concentration.

HOSE. The Subcommittee on Mechanical Rubber Hose will undertake a consolidation and amplification of the methods of testing rubber hose. The two existing A.S.T.M. Standard Methods D 379 and D 380, originally intended for testing rubber hose of braided and wrapped constructions, respectively, will be combined into a single set of test procedures, and the present methods will be supplemented by additional tests now required for various types and other constructions of hose, such as metal lined hose, hose subjected in use to gasoline and other petroleum products, woven hose, etc.

GLOVES. A canvass of the scope of use of the Specifications for Rubber Gloves for Electrical Workers on Apparatus or Circuits not Exceeding 3,000 Volts to Ground (D 120-23) has indicated that a very substantial percentage of such gloves are purchased in accordance with these A.S.T.M. specifications. The committee has studied the specification requirements, and minor changes are to be made this year to improve certain features of the specifications.

WIRE AND CABLE. The Subcommittee on Insulated Wire and Cable has completed revisions in the Tentative Specifications for Insulated Wire and Cable: Class AO, 30% Hevea Rubber Compound (D 27-36 T) and for Insulated Wire and Cable: Performance Rubber Compound (D 353-36 T). The table on insulation resistance (Table V) will be extended to cover the same range as the present table on test voltages: namely, up to 8,000 volts. Minor changes will be made in the electrical tests of multiple conductor cable. The moisture absorption test for braids has been found unsatisfactory and will be eliminated from the specifications. The dimensional features, particularly as to cross-section, of the test specimens are to be limited.

This subcommittee also reviewed a proposed draft of specifications for tough rubber sheath compound for cables. Specification requirements for heat-resisting compound for rubber insulation were also outlined. This subcommittee also considered the first draft of a new set of methods of test for insulated wire and cable whereby the detailed test procedures for the evaluation of such materials will be included in a standard separate from the purchase specifications. These several matters will be given further study.

ABRASION. The Subcommittee on Abrasion Tests for Rubber Products has been devoting its attention to ways and means of securing better reference standard rubber specimens for abrasion tests. Studies of certain abrasion compounds are now under consideration. The purpose of the investigations now in progress is to determine the feasibility of adopting standard compounds with certified physical properties for test reference samples. It is planned to work with three compounds, a high-grade tread stock, a medium-grade stock, and a low-grade mechanical goods stock.

AGING. Subcommittee XV on Life Tests for Rubber Products has completed a draft of a proposed method for air pressure heat test which will be circulated in the committee for consideration.

ABSORBING VIBRATION. The Subcommittee on Rubber Products for Absorbing Vibration gave consideration to a proposed method of test for compression set of vulcanized rubber which involves determination of permanent set by change in load characteristics rather than change in dimensions of specimens. The subcommittee discussed the proposed equipment, and a further program of study was outlined. This subcommittee also gave consideration to tests for indentation hardness testing of rubber and examined a new design of hand-type spring instrument.

OIL RESISTANCE. The Subcommittee on Tests for Properties of Rubber and Rubber-Like Materials in Liquids has reached agreement on details of a test method suitable for laboratory prepared specimens, including conditions of test, requirements for size of specimen, test liquid, type of equipment, methods of measuring increase in weight and volume, and tensile strength. This will be presented in the form of proposed Methods of Testing Vulcanized Rubber for Oil Resistance.

Mold Lubricants and Wetting Agents

MONSANTO CHEMICAL CO., St. Louis, Mo., is supplying a number of products for use in the rubber trade, the general characteristics of which are listed below.

"Areskap-50." 50% liquid. Mold lubricant alone or in conjunction with Rusco Mold Paste. Wetting out agent and detergent. Supplied in steel drums, 500 pounds, 125 pounds net.

"Areskap-100." Dry, a powder. Mold lubricant alone or in conjunction with Rusco Mold Paste. Penetrant and spreading agent for use with insecticides. Supplied in fiber drums, 50 pounds.

"Aresklene-375." Paste. Mold lubricant alone or in conjunction with Rusco Mold Paste. Wetting out agent for latex. Supplied in steel drums, 500 pounds, 125 pounds net.

"Aresklene-400." Dry, a powder. Mold lubricant alone or in conjunction with Rusco Mold Paste. Emulsifying agent and penetrant for use in dry mixes or solutions. Supplied in fiber drums, 50 pounds.

"Aresket-240." Liquid. Wetting out agent for use in alkaline solutions. Has surface tension reducing value. Supplied in steel drums, 500 pounds, 125 pounds net.

"Aresket-250." Alcoholic solution. Wetting out agent in limited instances. Supplied in steel drums, 500 pounds, 125 pounds net.

"Aresket-300." Dry, a powder. Wetting out agent in aqueous or non-aqueous media. Has surface tension reducing value. Supplied in fiber drums, 50 pounds.

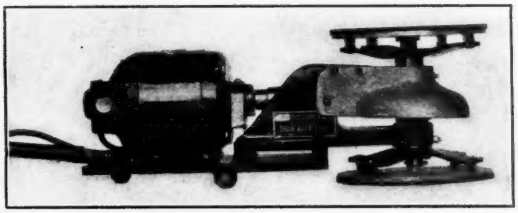
"Santomerse." A new product with exceptional qualities as a wetting and stabilizing agent for use in latex.

Tornalac

THE Paper Makers Chemical Division of Hercules Powder Co. has made a contribution to the field of corrosion resistant finishes: namely, Tornalac, a durable, quick-drying finish using as a base Tornesite, a chlorinated rubber. Tornalac can be applied in the same manner as any lacquer, i. e., brushing, dipping, and spraying, and dries to a tough, water and gas-tight film. The film becomes free from tack in 30 to 60 minutes after applying and is thoroughly dry after 24 hours. It has a coverage of about 350 square feet per gallon with a normal one coat application.

(*Continued on page 62*)

New Machines and Appliances



(Above) Spadone Press Cleaner

(Left) Span Cutting Machine

Rubber Scrap Cutter

THIS Span cutting machine is designed to reduce all grades of hard or soft rubber scrap to uniform pieces that will pass through a ½-inch screen. In addition to regular factory waste such as overflow trimmings and seconds, it is built to cut whole inner tubes, tire peelings or sections of old tires. Material to be cut is fed automatically by gravity. A suitable chute may be attached for loading a quantity at one time, or the uncut material may be fed from a chute or conveyer. Capacity ranges from 750 to 1,000 pounds per hour on soft rubber and from 1,200 to 1,500 pounds on hard rubber scrap.

The cutting mechanism consists of three stationary knives and three knives revolving at 750 r.p.m., driven through a V-belt by a 10 h.p. motor inside the base of the machine. The knives are easily removed for sharpening. This machine, weighing 1,100 pounds without the motor, occupies floor space 2 by 2½ feet, is equipped with ball bearings, has no gears, is simple in design, and is ruggedly built for heavy-duty work. M. Pancorbo, 155 John St., New York, N. Y.

Press Cleaning Machine

THE press cleaning machine fills a long felt need of manufacturers operating belt, packing, tiling, slab, or any large smooth-surface presses. The machine is small and compact, is operated by one man, and so arranged that it cleans both upper and lower platens at one time. There are two rotating heads resting on springs which have a very loose fit on the drive shaft, thus permitting the heads to seek a level plane, making full surface contact with the platen. These heads, one of which is adjustable, are each surfaced with removable nine-inch disks of a special abrasive which thoroughly cleans, but will not mar the platens.

The ⅓ H.P. motor enclosed so as to be dustproof and the mechanism driving the heads are mounted on a bed plate, which in turn rests on ball bearing casters. The machine is guided over the press platens by means of a long handle. An extension cord which can be attached to a nearby light socket leads from this handle in which is also conveniently located a trigger switch for power control. The machine weighs 100 pounds and is five feet in length overall. Spadone Machine Co., Inc.

Rubber Covered Roll for Paper Mills [1]

A RECENT patent covers a rubber surfaced metal roll for use in paper making machines and with which a doctor is commonly used. The particular objectives are to provide cheaply and efficiently a roll that will resist wear and the adhesion of paper or paper pulp and at the same time not injure the surface of the doctor itself.

Previously rolls for this purpose were manufactured of various materials as wood, granite, and other substances upon which hard, smooth surfaces could be produced. Previous rolls also included one comprising a body formed of a binder such as rubber having embedded crystalline or rock particles. All of the above types had their individual disadvantages.

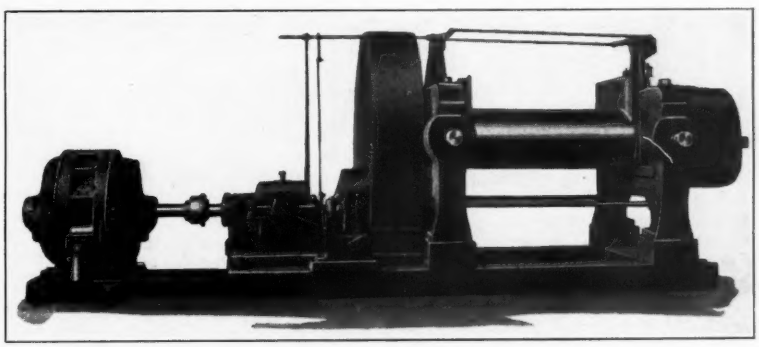
This newly patented roll may consist of a core, preferably metallic, enlarged between the bearing points on the core and throughout that portion upon which the effective roll proper is to be formed. Upon this enlarged portion of the roll the patent provides for a hard rubber or ebonite covering into which previously has been mixed particles of slag, preferably blast furnace slag. This mixing can best be done on a mill before the combined material is sheeted out and applied to the roll in its plastic state. After vulcanization produces hard rubber, the surface is ground to produce a surface that is uniform, smooth, and on which no projecting particles or points appear. The slag particles, being of cellular structure, do not wear smooth during subsequent regrindings, but minute pits appear on the surface of the slag particles, thereby aiding the roll's distinctive properties of avoiding paper adhesion. The blast furnace slag resists wearing smooth and also minimizes frictional wearing away of the doctor which is used with it. Other materials with a cellular structure such as cinders might successfully replace the slag particles, but might not be so resistant to wear.

[1] U. S. patent No. 2,062,317, Dec. 1, 1936.

Motorized 60-Inch Mill

THE new Thropp 60-inch individual motor driven extra-heavy duty mill has incorporated in its construction features to make the frame more rigid and to overcome vibration and hence increase its efficiency. The rigidity is enhanced by a tongue in the foot of the frame, which fits into a groove of the bedplate. Placing the jack shaft at the lowest point in the bedplate markedly reduces the inherent vibration.

(Continued on page 70)



Thropp 60-Inch Mill

New Goods and Specialties

Goodrich Earth Movers

449-Pound Tires

TRUCK tires designed for heavy service in the mining and construction fields where motorized equipment is used to move large quantities of soil and rock are announced by The B. F. Goodrich Co., Akron, O. The large tires, known as "earth movers," will carry a maximum of 15,740 pounds a casing, or nearly eight tons, are mounted on 13-inch rims, weigh 449 pounds, and are available in 12, 16, and 20 plys. The tubes weigh more than 53 pounds, and the flaps 12 pounds. Four of the Goodrich tires mounted on one axle will carry 60,000 pounds. The tires may be purchased with two types of tread, one for trailer uses on free moving wheels, and the other incorporating a super-traction tread for use in mud and soft ground.

The new tire is now in use on various government projects, including the California All-American canal, the Mohawk dam in Ohio, Mississippi flood control, and in several strip mining enterprises.

Surfaseal Brushing Rubber

A NEW line of rubber-base paints, especially protective against acid or alkali fumes and weather conditions, can be brushed on like ordinary paint.

Surfaseal #2 is especially recommended for steel. Successful installations include ducts and vents for carrying off acid and alkali fumes, as well as the outside of metal tanks, structural steel, and concrete where they are subjected to the corrosive effects of caustic and acid fumes and spillage. No primer is required for this material when it is applied to clean or sand blasted metal; and from two to five coats are recommended, depending upon the severity of the corrosive conditions. This protective coating material is flexible to a marked degree and has a hard, glossy finish. Standard colors are black and gray, but other colors are available at slightly increased prices on quantity orders.

Surfaseal #3 is much harder than Surfaseal #2 and is especially designed for concrete and masonry, where the surface is subject to abrasion. Surfaseal #3 has an extremely good bond to concrete, brick, masonry, plaster, etc.; it has a high gloss and good chemical resistance. It is an excellent all-purpose protection. Two coats are required for best appearance; and where the surface is subjected to acid or caustic spillage, etc., a third coat of Surfaseal #2 gives a most excellent job. Standard colors in Surfaseal #3 are gray, red, and black. Collord, Inc.

Hagen Vulcord

Vulcord Golf Ball

THE principle of Cord tire construction has been introduced into the manufacture of the Hagen Vulcord golf ball. The continuous length of cord embedded in the cover under pressure holds the ball in shape and reenforces the cover, thereby enabling the use of a thin cover. This construction is claimed to combine the toughness of the heavy cover and the distance of the thin one. The outer layer shown in this picture is balata, inside of which is visible the cord actually embedded in the cover and then the inner strata of balata. Beneath this is shown the regulation rubber winding fused to the inner side of the cover. L. A. Young Golf Co.

Gasoline Hose Nozzle Tube

"FLEXO-FLO," the new gasoline pump hose nozzle tube manufactured from "Thiokol," oil-proof synthetic rubber, is rapidly being adopted by service station operators. Decidedly an improvement over the flexible metal type nozzle tube, this device protects and aids the pump operators in their tank filling duties.

The most important features for the service station operators and the customers are: its flexibility characteristics; the silence of operation; freedom from any possibility of scratching the fenders, trunk, or fittings of the car; and elimination of dripping and splashing gasoline on the automobile because the smooth bore of the tube permits a smooth, steady flow and quick, complete drainage after the gas is shut off, in contrast to the action with the rough interior of the spiral metal nozzle tube. The ability of this tube to be turned in any direction with ease, enables the operator to push the tube deep into new gasoline tanks with an elbow in the fill-spout, and open the meter valve to the limit for quick tank filling.

Special molds were designed successfully to mold the threads on the compression shoulder which takes the strain away from the threads and reenforces the nozzle at the point of strain. The molded rubber threads conform to any variations in the threads on the metal nozzle valve, thus producing a gasoline-tight seal.

The inset picture shows the ease with which the nozzle can be bent. "Flex Flo" is a product of the Gates Rubber Co. "Thiokol" is manufactured by Thiokol Corp., Yardville, N. J.

Thiokol Corp.

"Flex-Flo" Nozzle Tube

Rubber Industry in America

EASTERN AND SOUTHERN

LABOR disturbances, unfavorable weather conditions and heavier income tax payments combined to check business activity to some extent last month in many sections of the country. Easter buying, also, was not so great as anticipated. Despite these unfavorable factors, however, except in the divisions experiencing labor trouble industrial operations were maintained at high levels, production in many plants being the heaviest in years.

Business is quite brisk in the South. Thousands of employes have received wage increases, and employment continues to gain. There is little labor trouble here. Building operations are also increasing steadily.

Witco Carbon Co., 295 Madison Ave., New York, N. Y., to avoid confusion has, according to President Robert I. Wishnick, changed its name to Continental Carbon Co. Personnel, officers, and directors remain the same. Additional units of the plant at Sunray, Tex., are in production and supplying a carbon black of closely controlled quality which, considering the rapidly growing demand, comes at a most opportune time. Because of the increasing consumption the company is pushing forward construction on the final units of its plant vigorously and expects soon to operate at capacity.

Mr. Wishnick, who is also head of Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, has been elected a member of the board of trustees of Armour "Tech," as representative of the alumni. He was graduated in 1918.

United States Supreme Court recently upheld as a constitutional exercise of a state's police powers, prohibition by Texas of the use of "sweet" natural gas for the production of carbon black.

St. Joseph Lead Co., 250 Park Ave., New York, N. Y., on March 11, held its annual stockholders' meeting at which President C. H. Crane informed the gathering that net profit for the first quarter of 1937 will exceed that of the final quarter of 1936. He further declared the price of metals "unhealthy" and fears a shortage of lead in this country if demand continues at the present rate. The stockholders authorized an increase in the board of trustees from eleven to thirteen members. Frederic E. Camp, a large stockholder, and E. V. Peters, a vice president, soon will be elected to the two positions thus created.

Rubber "on the Air"

On March 20, through the courtesy of the Columbia Broadcasting System, a brief story of the discovery by Hernando Cortez in the sixteenth century of rubber balls made from latex by the Mayan tribes and later by the Aztecs and a history of the development of the rubber manufacturing industry was broadcast to the general public. This talk was the tenth of a series being given by the Department of Commerce on subjects relating to various industries and commerce, each Saturday afternoon between 3:30 and 3:45.

In an effort to cooperate with American industry the purpose in undertaking such a program is to assist industry in giving to the radio audience a more intelligent appreciation of the character of service in daily life which is rendered by American business organizations.

K. E. Oberlander, of Dominex, Ltd., London, England, has arrived in New York, N. Y., to obtain lines for distribution in the United Kingdom and the Colonies. All factories interested in obtaining business from abroad may address him at the Manufacturers Products Corp., Two Broadway, New York.

Hohwieler Rubber Co., Morrisville, Pa., reports business in February the largest in its history. The company, operating overtime, is shipping considerable of its goods to southern states. William Hohwieler, owner of the company, is also engaged in industrial work for other rubber concerns.

Herbert E. Noble, manufacturers' agent, recently moved from 175 Fifth Ave. to 17 Warren St., New York, N. Y. Among the lines represented by Noble are Robins Hygienic Mat Co., Shelton, Conn., manufacturer of rubber bowling sets and deck tennis sets; Indian Archery & Toy Corp., Evansville, Ind., maker of archery and dart games; Giant Grip Mfg. Co., Oshkosh, Wis., horseshoe pitching games; and Cluff Fabric Products, New York, maker of marine equipment and boat cushions.

Innis, Speiden & Co., chemical manufacturer, 117 Liberty St., New York, N. Y., has announced the resignation of C. L. Speiden, secretary. His successor is H. G. Mackelcan, who joined the company 29 years ago as a junior clerk and subsequently served the firm in almost every capacity, in 1926 becoming general sales manager and in 1927 vice president in charge of sales.

Southern Federation Associates recently held its third annual meeting in Atlanta, Ga., attended by about 125 technical men in the paint, varnish, and lacquer industry. Among the visitors were V. C. Bidlack, president, and George B. Heckel, secretary, of the Federation of Paint and Varnish production Clubs, of which the Southern group is an affiliate. On the first day's program, among other papers, were an explanation of Titanox primers by I. W. Robertson, of Titanium Pigment Corp.; an outlining of selection of primers by S. Werthan, of New Jersey Zinc Co., and a discussion of synthetic iron oxides by K. E. Burgess, of the Magnetic Pigment Co. Consideration of problems was continued in a round-table assembly the second day. A. P. Mills opened the discussion on "Repainting Mildewed Surfaces." Raymond A. Perry presented some new information on "The Formulation and Use of House Paint Primers on Southern Yellow Pine." More comment on primers, with special reference to exterior work, was made by E. M. Fairbrother. A grand bowling tournament was a feature of the convention. Second prize went to Peters, of New Jersey Zinc. Donors of the many prizes offered included American Cyanamid & Chemical Corp., Eagle-Picher Lead Co., New Jersey Zinc Sales Co., Titanium Pigment Corp., and R. T. Vanderbilt Co.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., to fill the vacancy caused by the death of Edward Pitcairn elected as a director Edward T. Asplundh, assistant vice president of the Columbia Chemical division.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y., recently acquired the business of H. A. Metz & Co., Inc., Newark, N. J., and proposes to consolidate the property. American Cyanamid will erect a two-story warehouse as part of an expansion program in Charlotte, N. C., making the fourth unit in the firm's southern headquarters there.

Erie Foundry Co., Erie, Pa., on March 15 held a meeting of the board of directors to fill the vacancy caused by the death of John R. McDonald, company treasurer. His successor on the board is D. W. MacDonald; while D. A. Currie, Erie president and general manager, was given the position of treasurer. L. F. Walker was elected assistant secretary, and C. D. Pinney assistant treasurer.

The New Jersey Zinc Co., 160 Front St., New York, N. Y., at its recent annual meeting elected Executive Vice President Frank N. Spencer, a director. He joined the company in 1916 as assistant to the general manager, becoming, successively, assistant general manager of manufacturing, general manager of manufacturing, vice president (1927), and executive vice president (1936). Mr. Spencer belongs to the American Institute of Mining and Metallurgical Engineers and American Society of Civil Engineers. Mr. Spencer, who was born in Toledo, O., was graduated from Princeton in 1905 with the degree of civil engineer.

Raub Supply Co., Lancaster, Pa., distributer in Pennsylvania of products of the Republic Rubber Co., Youngstown, O., under the direction of Secretary S. H. Raub, Jr., acted as host at a dinner-meeting March 10 at Hotel Mallow-Sterling, Wilkes-Barre, Pa., of engineers and purchasing agents of the local coal companies, mills, and dealers in rubber products. The principal speaker was Carl H. Zieme, consulting service engineer of the Republic company. Other guests included H. Schultz, Republic general manager, George Smith, assistant sales manager; and C. R. Case, sales representative for Pennsylvania.

National Association of Purchasing Agents, 11 Park Place, New York, N. Y., will hold its twenty-second annual international convention of purchasing agents May 24 through 27 at Hotel William Penn, Pittsburgh, Pa., when from 1,200 to 1,400 purchasing executives are expected to attend. Ninety exhibits of industrial products and processes will be presented in the Inform-a-Show, an exposition which is a feature of the gathering.

Filatex Corp., Northampton, Pa., manufacturer of elastic yarns, has purchased the former plant of Belle Mead Sweets, Inc., in Prospect St. district, Trenton, N. J., comprising the main one-story unit, 60 by 350 feet, and a two-story office building adjoining.

Barber Co., Inc., Philadelphia, Pa., has named as sales manager Theodore T. Toole, formerly associated with the Philadelphia & Reading Coal & Iron Co., the E. I. du Pont de Nemours Powder Co., and the National Cash Register Co.

Society of Chemical Industry, American Section, 305 Washington St., Brooklyn, N. Y., will hold a meeting April 9, at 7:45 p.m. at The Chemists' Club, 52 E. 41st St., New York, jointly with the American Chemical Society. James G. Vail will preside. The speaker will be Professor James E. Kendall, head of the department of chemistry of the University of Edinburgh, in America on a tour. His subject will be "Liquids and Solutions," a field in which much has been done, but which is open to many future possibilities. A dinner will precede the meeting, starting at 6:30 p.m.

John S. Krauss

Gilmer Company Celebrates

Marking the twenty-fifth anniversary of his service with the L. H. Gilmer Co., some 60 executives, department heads, and employe representatives of this well-known rubber belting manufacturing organization last month tendered a testimonial dinner at the Warwick Hotel to President John S. Krauss. The loyal and cordial relations existing between employes and management in the Gilmer company was manifested in the tribute to Mr. Krauss. In the brief remarks from employes representing every group a recurring note of cooperation and good will was crystallized by Thomas G. Drinkwater, president of the Workers Union. Surrounding Mr. Krauss at the table were employes from every department, salesmen, factory workers and executives, clerks, directors, and foremen.

A full week's vacation with pay for all factory workers with service over a year, and days off with pay for lesser periods, was announced at the dinner, together with reports covering other phases of the company's employe relationship program — The Beneficial Association, annual outing, and the Engineering and Production School for employes. Chas. H. Bridenbaugh, secretary and treasurer, presided, and Hamilton R. Disston, vice president, was toastmaster.

Carl L. Reed, export manager, Kelly-Springfield Tire Co., Cumberland, Md., recently returned from a business trip which took him to Cuba, Jamaica, Colombia, Venezuela, Trinidad, Brazil, Uruguay, Argentina, Chile, Bolivia, Peru, Ecuador, Panama, Haiti, and Puerto Rico. He made new business arrangements for Kelly-Springfield in Maracaibo, Venezuela; Port of Spain, Trinidad; Natal and Sao Paulo; Brazil, La Paz, Bolivia and Lima, Peru. Notwithstanding certain exchange difficulties in Chile and Ecuador, business activities were good throughout most of the countries he visited, according to Mr. Reed.

National Association of Independent Tire Dealers, Inc., has leased quarters at 250 W. 57th St., New York, N. Y.

Safetex Co., Inc., has moved its plant and main offices to 77 Riverdale Ave., Port Chester, N. Y. A New York, N. Y., office will be maintained at 277 Broadway.

OBITUARY

Nelson P. James

NELSON P. JAMES, 48, for ten years president of the James Rubber Co., Boston, Mass., died March 20 after an operation. He began his career with the Firestone Tire & Rubber Co. and later was with the Miller Rubber Co. Surviving are his parents, his wife, and two sons.

W. D. Anderson, Jr.

W. D. ANDERSON, JR., 36, president of the Bibb Mfg. Co., Macon, Ga., who died recently, was the only son of W. D. Anderson, president of the company for 38 years until his elevation to chairman of the board in March, 1936. His son, after graduating from the University of Georgia in 1921 and then attending the Philadelphia Textile School, worked for several years in New Bedford, Mass., for mill experience. Next he joined the Bibb concern as salesman, becoming successively sales manager, vice president in charge of sales, and finally president.

Robert Pritchard

ON MARCH 2 Robert Pritchard, 74, a foreman, until his retirement last July, of the Mercer Rubber Co., Hamilton Square, N. J., where he had been employed 37 years, died after a lengthy illness. He is survived by a daughter and two sons. Burial was at Crosswicks, N. J.

W. R. Carman

AFTER a long illness, on March 1, death came to William Richard Carman, 71, for many years a foreman of the Vulcanized Rubber Co., Morrisville, Pa., where he had worked 46 years. Surviving the deceased are his wife, two sons, and a daughter. Interment was at Morrisville.

Carl F. Siemon

CARL F. SIEMON, 67, president of the Siemon Hard Rubber Co., Bridgeport, Conn., of which he was one of the incorporators in 1903, died at sea last month. His body was brought to Bridgeport for funeral services on March 19. Mr. Siemon, a former resident of Fort Wayne, Ind., was also a Shriner. Surviving are his wife, a son, a daughter, and a sister.

EVERY CHEMIST SHOULD HAVE HIS OWN copy of "Compounding Ingredients for Rubber." $2.50 postpaid in U. S. A.; $2.75 elsewhere.

OHIO

OHIO also is in the throes of labor trouble and its ill effects. The strike at Firestone, of course, is the biggest item. Metal plants, too, are being affected by the labor difficulties in other industries, and several plants are operating on reduced schedules.

General Tire Expands

March 1 production began at the new mechanical rubber goods factory at Wabash, Ind., of the General Tire & Rubber Co., Akron, which already is turning out a great variety of rubber products for the automotive, refrigeration, and other industries. Situated on a site covering 30 acres of ground, the plant, purchased last fall by General Tire, was formerly occupied by the Service Motor Truck Co. Remodeling the plant and installation of new machinery have been under way for several months. Installation of a complete water supply system to furnish to 3,000,000 gallons of water daily, the plant's requirement when in full operation, was one of the major improvements recently completed. Total floor space of 200,000 square feet is now available for the manufacture of a wide variety of mechanical rubber goods, but tires will not be manufactured in the new plant, according to present plans.

Howard M. Dodge is general manager of the Wabash plant, assisted by William O'Neil, Jr., eldest son of William O'Neil, president of General Tire.

In America the company's tire manufacturing operations are confined to Akron; while in Mexico City, Mexico, General Tire's associated company, Cia. Hulera el Popo, manufactures General Popo tires; in Canada, General tires are made and distributed by the General Tire Co. of Canada, Ltd.; and in Poznan, Poland, General also has a working agreement with Stomil, Ltd., Poland's only tire factory for the manufacture of tires according to General's specifications.

Mr. O'Neil, L. A. McQueen, sales manager, and several other General Tire officials recently completed a 10,000-mile tour in two months, in which dealer conferences were held in a dozen cities where the company's district headquarters are located. Nearly 3,000 dealers and salesmen attended these conferences and heard General executives outline the company's sales policies, discuss new developments, and explain the best way to take advantage of General's merchandising methods.

At each of the meetings was shown a safety sound motion picture, recently made in New York under the supervision of the A.A.A. and with the cooperation of the New York Police Department, to demonstrate the ability of General Dual 10 tires to stop a speeding car quickly and straight in its tracks on a wet asphalt pavement. This picture will be available to General distributers, in both sound and silent forms.

President O'Neil told General dealers that car owners' demand for better merchandise and particularly for the highest quality in motor-car tires is the most significant development in the tire industry today.

"With the trend in the tire market being constantly upward, the wise dealer and the wise car owner is protecting himself by obtaining now the merchandise that he will need before prices are further advanced," Mr. O'Neil said.

Other General Tire officials who addressed the conference sessions were Kark Dalsky, truck tire sales; Ernest Leach, special products sales; Frank Gable, factory engineer; and the heads of the various sales districts. Cities visited included New York, Boston, Chicago, Kansas City, Dallas, Memphis, Atlanta, Seattle, San Francisco, Los Angeles, Denver, and Akron.

Goodyear News

The Goodyear Tire & Rubber Co., Akron, recently announced two personnel changes. R. S. Pope, formerly personnel manager at California and for the last two years secretary to President Paul W. Litchfield was made assistant personnel manager. A. B. Matthews, manager of the employment division, was named manager of the labor department, succeeding K. L. Reynolds, assigned to other duties.

Goodyear on March 16 raised tire prices 6%. A general increase of 6% by all manufacturers was made January 18.

Tom Green and George Smith, textile foremen from Goodyear-California, recently paid their first visit to Akron headquarters. Then they went on to visit Goodyear and non-Goodyear mills in the South, studying operating methods, exchanging information with Goodyear eastern and southern mill men.

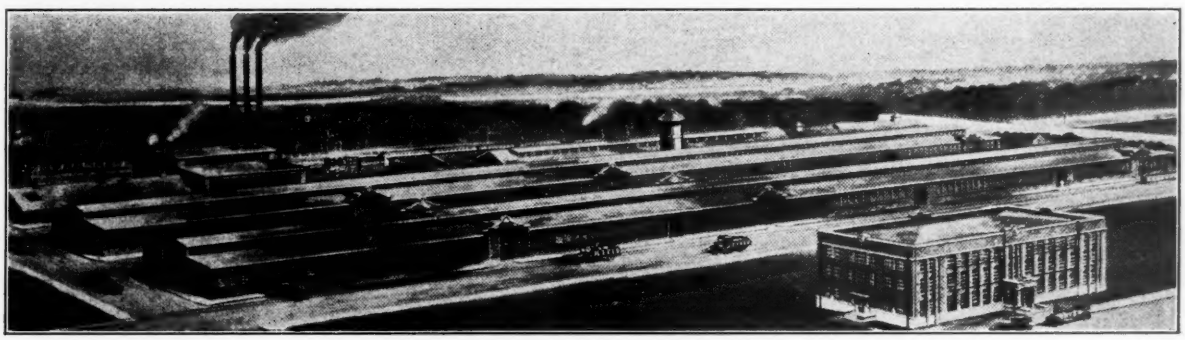
J. J. Blandin, manager of the crude rubber division, who largely laid out Goodyear's rubber plantations in Sumatra in 1916, last month received his 25-year service pin from Vice President C. Slusser. Other recipients of quarter-century pins, plus company gifts of $250 each, were J. C. Goodall, James L. Winters, and J. C. Senn.

Wm. Urquhart, Goodyear consulting engineer, recently celebrated twenty years with the company.

Since the exchange privilege carried by the outstanding $7 second preferred stock of Goodyear ended at the close of business March 13, the New York Stock Exchange has ruled that deliveries of this stock in settlement of transactions made on and after March 11, except transactions made specifically for cash on March 11, 12 and 13, will not permit the purchaser to make the exchange. By March 13, 747,739 shares, or more than 98%, of Goodyear's second preferred stock had been deposited for exchange into new $5 convertible preferred stock and common stock under the terms of the plan for rearrangement of capitalization. Only 11,201 shares of the second preferred stock remained outstanding, and dividend arrearages on this issue were eliminated with the payment of a dividend of $14.75 per share on March 25 to holders of record on March 15.

Goodrich Notes

On March 15 a general price advance of 10% on all mechanical rubber



New General Tire Mechanical Goods Plant at Wabash, Ind.

goods, effective April 1, was released by The B. F. Goodrich Co., Akron, through Vice President J. H. Connors.

Extension of its line of Goodrich Kathanode Electro-Pak batteries to the marine field was announced recently by Goodrich. Made in different sizes and capacities to fit the needs of various boats, these batteries carry a three-year guarantee and adjustment policy, for marine service regardless of the conditions of service under which the boat has been operated or the distance traveled. This guarantee is made possible by the patented Kathanode construction, which gives much longer plate life because the special, flexible spun glass retainer mats are designed to prevent the loss of power-producing materials in the plates. The new battery has, in addition, the exclusive Goodrich power-saving top cover, which seals in the power, and protects the battery against dirt, salt spray, acid film, corrosion, and other sources of power loss.

Ira G. Needles, tire division merchandising manager of The B. F. Goodrich Co. of Canada, Ltd., Kitchener, Ont., recently completed 20 years with Goodrich, according to S. B. Robertson, executive vice president of the parent company. Mr. Needles joined Goodrich in 1916 and held sales department positions in Akron, New York, and Philadelphia before going to Canada in 1925.

Presentation of 1936 Facts to Employes

In "Circle," the employes' newspaper, Goodrich tells the story of its 1936 operations. The disposition of each sales dollar was proportionately: Materials and supplies, 45¢; wages and salaries, 32¢; taxes, 7¢; interest, 2¢; all other manufacturing, distribution, and miscellaneous expense, net, 9¢; retained in business, 3¢; paid to owners, 2¢.

On January 1, 1930, the surplus was $25,747,000, but during the depression payment of wages, purchase of materials, etc., necessitated the use of all but $7,441,432, the present surplus, which, it is hoped, may be built up from 1937 profits so as to provide protection for future "rainy days." It was explained that stockholders have provided approximately $3,000 per employe and that they have a right to expect a reasonable return on their money as dividends and that although no dividends had been paid between July 1, 1931, and July 1, 1936, the stockholders had recently surrendered their claims to back dividends in the hope that the future would bring them continuous dividends through uninterrupted business operations.

Rising raw material costs will make it more difficult to repeat in 1937 the favorable showing made in 1936 which was largely due to favorable prices of raw materials: for instance No. 1 ribbed smoked sheets are now selling at well over 20¢ per pound as compared with 13½¢ in January, 1936. If the 1936 showing could be repeated year after year, the firm would be able to continue satisfactory wages and salaries, to pay dividends, and to keep a reasonable amount in the business to protect the 25,000 employes who work for Goodrich and the 22,000 stockholders whose investments are responsible for the company's existence.

Forty-seven thousand people banded together under the name of Goodrich in 1936, which resulted in steady employment at good wages and salaries with a net profit of $7,319,507 on total sales of $141,097,136.

The American Industrial Rubber Co., manufacturer of mechanical rubber products, 526-536 So. St. Clair St., Toledo, has changed its name to The Toledo Industrial Rubber Co. Officers follow: H. H. Wolfe, president and treasurer; W. B. Frey, vice president and secretary; A. R. Nazar, general manager.

De Vilbiss Co., Toledo, manufacturer of atomizers and spray painting equipment, will build a completely new rubber products plant to replace one built in 1928. The new plant, to cost $175,000, will be on Lagrange St. near the new bridge over Ottawa River. Considerable land in the vicinity has been made available for boulevard purposes. When the new plant is completed, the former unit will be used to house an expanding department of the company. De Vilbiss went into the rubber products business in a very small way in 1924 to get a uniform quality of bulbs for atomizers and hose for spray-painting machines. Now it cannot keep up to its sales of kindred products made for general distribution.

Sales Manager

Another well-known figure in the rubber industry is Herman R. Thies, manager of Pliolite sales for the Goodyear Tire & Rubber Co., Akron. He was born in Peck, Kan., September 27, 1895. He majored in chemistry at Phillips University, Enid, Okla., receiving an A.B. in 1917, and in 1920 the University of Chicago conferred an M.S. upon him.

H. R. Thies

As Mr. Thies was about to embark on his business career, the United States entered the World War; so from 1917 to 1919 he served as a lieutenant in the heavy artillery division of the U. S. Army.

Returning to mufti, he became a chemist, in 1920, with the Miller Rubber Co. In 1922 he was appointed director of the firm's testing laboratory and in 1927 was made assistant director of research. In 1930, however, Mr. Thies came to Goodyear as a research compounder. He was transferred to new products development in 1932 and was named assistant manager of research the next year. Three years ago he was given his present position.

Mr. Thies belongs to the Torch Club, Delta Phi Sigma, and the American Chemical Society. With the latter he has acted as a member of the executive committee of the Rubber Division and as treasurer and vice chairman of the Akron Section. He is also the author of several articles on various phases of rubber chemistry.

LEGAL

Patent Suits

1,928,404, J. H. Woock et al., Method and apparatus for retreading tires, D. C., S. D. Calif. (Los Angeles), Doc. E. 266-J, *Super Mold Corp.* v. *S. Schuster et al.* Decree for plaintiff; injunction Jan. 8, 1937.

2,039,529, R. H. Guinzburg, Rubber products, D. C., S. D. N. Y., Doc. E 84/147, *I. B. Kleinert Rubber Co.* v. *Ira Novick & Co.* Consent decree for plaintiff (notice Dec. 26, 1936).

MEXICO

Cia. Hulera de Parras S. A., Parras, Mexico, is expected soon to resume production of guayule rubber. Don Salvador Madero holds control and management of the company. R. Rumsey, of Nolan, McNeil & Co., Inc., Eight Bridge St., New York, N. Y., is sole agent for the United States and Canada.

Tornalac

(*Continued from page* 56)

The Tornalac film has an exceptional bond to metal, wood, and concrete. It is hard, hence is easily scoured and cleaned, and is especially resistant to the corrosive action of acids, alkalies, salt and bleach solutions, and corrosive vapors. Very favorable reports have been received from paper mills, asphalt plants, and dairies commenting on the high degree of protection afforded by Tornalac films.

NEW ENGLAND

CONDITIONS in New England are good. Shoe manufacturers generally are working at capacity. The textile industry is booming, particularly the cotton end. Some manufacturers report more orders on hand than at any time since the World War. Nearly all miscellaneous manufacturing lines, moreover, are operating at high speed.

Payrolls of rubber goods manufacturers in February, totaling $310,854, were 20.3% greater than in February, 1936, and 11.3% greater than in January, 1937, according to a recent report by the Brown Bureau of Business Research.

Sergeant-at-Arms of New York Group

Young Dave Scott (to distinguish him from his father, David C. Scott, Sr., president and treasurer of Henry L. Scott Co., manufacturer of testing machines, 101 Blackstone St., Providence, R. I.), is of the newer generation of business men of whom much is expected. He was born in Johnston, R. I., December 6, 1912, and attended Brown University, Massachusetts Institute of Technology, Rhode Island School of Design, and Bryant Business College. In 1934 David C. Scott, Jr., joined the Scott company as a salesman and assistant to the treasurer. He is now assistant treasurer of the concern and a member of the board of directors.

Mr. Scott has many outside interests. He is sergeant-at-arms of the New York Group, Rubber Division, American Chemical Society, a member of the Boston Group and of the executive committee of the Rhode Island Rubber Club as well as of committees D-11 and D-13 of the American Society for Testing Materials. Besides he belongs to the Chemists' Club of New York; Brown University Yacht Club; North American Dinghy Association, for which he races 10-foot boats every Sunday throughout the winter months in Bristol Harbor; Rhode Island Yacht Club; Gloucester Country Club; and the Y. M. C. A. Mr. Scott, moreover, is a motor boat enthusiast and enjoys catching trout, fishing from his boat during the summer months in Black Island Sound. He is not married.

He lives at 48 Angell St., Providence.

David C. Scott, Jr.

Collyer Insulated Wire Co., Pawtucket, R. I., effective March 15 granted an upward wage adjustment averaging 5 to 7% and affecting some 600 employes in its plants in Pawtucket and Central Falls. This increase, it was explained, was made voluntarily and is in line with rates now effective in similar companies.

Joseph L. Kelley, of Pawtucket, R. I., agent for the Hewitt Rubber Corp., Buffalo, N. Y., has been awarded the contract by the Purchasing Board of Pawtucket for supplying 1,000 feet of 2½-inch, double jacket, wax treated fire hose to be supplied in 50-foot lengths with Hyco couplings at $1.05 per foot.

Farrel-Birmingham Co., Inc., Ansonia, Conn., at its annual stockholders' meeting on February 18 reelected the following officers: Nelson W. Pickering, president; Franklin Farrel, Jr., chairman of board of directors; Carl Hitchcock and Armin G. Kessler, vice-presidents; Frederick M. Drew, Jr., treasurer; Laurie K. Blackman, assistant treasurer; George C. Bryant, secretary; William B. Marvin, assistant secretary. The entire board of directors was also reelected, with the addition of Franklin Farrel III, the fourth generation of the Farrel family in direct descent from the founder to be actively associated with the company.

Russell Mfg. Co., Middletown, Conn., has sold two of its unused mills in the course of a rehabilitation program.

Paragon Rubber Corp., Easthampton, Mass., reports that a complete overhaul of all machinery and equipment has been made in preparation for a very busy year. The factory began operations for this season on March 8 and is now working three shifts, 24 hours per day.

Myron H. Clark, for many years closely associated with the rubber industry, is now head of the firm of Myron H. Clark & Associates, management counsel, with offices at 70 State St., Boston, Mass. Mr. Clark, a graduate of Massachusetts Institute of Technology, started with the rubber industry as chemist, later becoming foreman, superintendent, factory manager, and finally general manager of footwear and miscellaneous factories of the United States Rubber Co. After leaving the rubber industry, Mr. Clark was in charge of operations for Johns-Manville Corp. and later was vice president in charge of production for Reading Iron Co. He is a member of American Society of Chemical Engineers, National Association of Cost Accountants, American Management Association, and the Society for the Advancement of Management. Mr. Clark has always been active in community affairs such as being director of a bank, of a Chamber of Commerce and a Y. M. C. A. chairman of a Community Chest Campaign, trustee of two hospitals, and chairman of a Depositors' Committee for the reopening of a closed bank. While Mr. Clark's firm conducts a general consulting business, he is now specializing in the field of employer-employe relations, approaching this problem through a careful and broad training program for the executive and supervisory group.

Blank & Stoller

Myron H. Clark

The Rubber Institute of Northern California, 519 California St., San Francisco, Calif., recently put into effect a new schedule of prices covering service charges on battery work, brake service, and lubrication. Officers of the institute are D. H. Elliot, president; Hugh Keville, vice president; N. C. Viss, treasurer; Paul I. Myers, secretary-manager and counsel.

W. C. Hardesty Co., Inc., manufacturer of stearic acid, red oil, and glycerine, 41 E. 42nd St., New York, N. Y., through President W. C. Hardesty announced that it has secured a site in the Maywood, Calif., district for the location of a new plant. The firm had a factory at Wilmington, Calif., but it was recently destroyed by fire. W. J. O'Connell is the concern's western division manager.

NEW JERSEY

SOME rubber factories in New Jersey have been affected to such an extent by the automobile strikes in the Midwest that they were compelled to lay off help in the automotive departments. But manufacturers in general report that business is holding up very well despite labor conditions. Labor organizers have not advanced far in unionizing employes. The shoe industry showed some gain during the month.

The Watson-Stillman Co., hydraulic machinery builder, Roselle, N. J., has appointed as its chief engineer Richard W. Dinzl, who recently resigned from the Baldwin Southwark Co., Philadelphia, Pa., where he had been in charge of engineering for the Southwark Division. Watson-Stillman has also opened a sales office at 83 S. High St., Columbus, O. John C. Grindlay will be in charge, covering the Kentucky, southern Ohio, and southern Indiana territory.

Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., recently opened a new branch office and warehouse at 778 Brannan St., San Francisco, Calif., under the management of A. R. Bradshaw, Pacific Coast representative.

William R. Thropp & Sons Co., Trenton, manufacturer of rubber machinery, is erecting a boiler house.

Joseph Stokes Rubber Co., Trenton, has awarded a contract for a one-story brick and steel addition, 128 by 75 feet, to be used for hard rubber manufacture. Paul Dunkel, general manager of the Stokes Welland, Ont., Canada, plant, ill for some time in the Toronto General Hospital, is reported to be improving.

The Pocono Co., Trenton, continues busy with increased orders for cloth material.

Acme Rubber Mfg. Co., Trenton, reports that March business showed a big increase over February output. An official also stated that considerable new business is being booked.

C. Edward Murray, Jr., vice president of the Crescent Insulated Wire & Cable Co., Trenton, and Mrs. Murray have been on a three weeks' South American cruise.

Puritan Rubber Co., Trenton, found business declined for rubber tiling during February. The concern later will make some improvements to its factory.

Pierce-Roberts Rubber Co., Trenton, continues to operate with three shifts.

Bruce Bedford, president of the Luzerne Rubber Co., Trenton, and his wife spent a month in Key West, Fla.

Dural Rubber Co., Flemington, which closed some time ago, remains intact, as far as machinery and other equipment are concerned, but some of the jobbers have removed their equipment from the plant.

Blank & Stoller

Jack Miscall

Well-Known Chemist

Gentlemen, we give you Jack Miscall, manager of the industrial rubber division, The Flintkote Co., E. Rutherford, N. J., and chairman of the New York Group, Rubber Division, American Chemical Society. Born in Albany, N. Y., March 29, 1901, in due time he attended the local grade and high schools and Cornell University, where he majored in chemistry and earned the following degrees: B.S., 1923; M.S., 1924; and Ph.D., 1928.

Dr. Miscall served as an instructor at his Alma Mater from 1922 to 1928 and also spent the years 1926 to 1928 doing outside work as a consulting chemist. Flintkote signed him in 1928.

He belongs also to Al-djebar, Phi Kappa Phi, Sigma Xi, and Kiwanis Club. Among his hobbies he lists bowling, swimming, and tennis.

He is married and the proud father of a boy 1½ years old and a girl 4½. The Miscalls reside at Normandy Park, Morristown, N. J.

David M. Litwin, custodial receiver for the American Rubber Products Co., 125 Hillside Ave., Hillside, N. J., has been directed by Vice Chancellor Berry to take charge of the assets of the concern at that place or wherever in New Jersey he may find them. The court made the appointment on application of John H. Abrams and Morris L. Stepner, both of New Bedford, Mass. They asserted that in March, 1936, they entered into a partnership with Harry Friedman, of Hillside, whereby they were to conduct a business under the name of American Rubber Products Co., in Boston and to do a like business in New Jersey. They charged that Friedman had violated the agreement. The vice chancellor has issued an order to show cause why the receiver should not be continued.

Thiokol Corp., Yardville, is operating overtime. Edward Wright, for a number of years with the Gates Rubber Co., Denver, Col., has been appointed to the Thiokol sales engineering department.

The Thermoid Co., Trenton, has let a contract for a brick building to cost $4,000 to replace the warehouse recently destroyed by fire.

MIDWEST

LABOR troubles continue in the Midwest, with all attendant disadvantages not only to the industry directly involved, but to so many others related to it in some way or another because of the economic structure of the day. New car registrations, though, are running ahead of last year's figure; while steel output holds steady at about 82%, with order backlogs still high. Building likewise continues to improve sharply. Prices of farm products remain at high levels. In Minnesota in one week alone announcements were released of nearly $5,000,000 worth of commercial expansion in urban centers.

Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill., manufacturer of molded and extruded rubber goods, hard rubber, sponge rubber, friction tape, soles and heels, established in 1901, according to President George B. Dryden, on April 1 granted its 1,800 workers a wage increase of 25%. This represents $500,000 additional in annual wage payments.

Goshen Rubber & Mfg. Co., Goshen, Ind., plans increasing its authorized preferred stock to 1,000 shares of $100 par value.

Servus Rubber Co., footwear manufacturer, Rock Island, Ill., held its annual stockholders' meeting March 9 at which company directors were re-elected. These in turn renamed all officers to their present positions besides making General Manager C. E. Little also a vice president. Officers follow: president, Max Kalter; vice presidents, J. M. Schaap, J. Arronson, and Mr. Little; secretary-treasurer, Samuel S. Flug; assistant secretary-treasurer, Arnold W. Wurbs. Directors include Carl A. Hallgren, chairman, Messrs. Kalter, Flug, and Schaap, John G. Huntoon, Allan J. Althemier, J. B. Icely, Richard Levy, and Sam Camitta, Jr. The firm, reorganized last fall, employs more than 1,000 workers, and the factory payroll for the first quarter of 1937 ran to about $260,915, as against $160,897.69 in the corresponding period last year. Mr. Kalter reported that the open winter and lack of snow had an adverse effect on sales of winter rubbers, but the plant is busy on tennis shoes, hoping increased volume will make for a small profit at least. Rising costs of raw materials and labor plus higher taxes also are unfavorable factors.

Editor's Book Table

NEW PUBLICATIONS

"The Vanderbilt News." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. The March-April issue of 28 pages is devoted to a study of the effect on the tear resistance of a rubber compound by increasing loadings with the following fillers and pigments: channel black, P-33, Thermax, zinc oxide, Kalite No. 1, gilder's whiting, natural ground whiting, and Dixie Clay. The loadings used are 0, 2.5, 5, 10, 20, and 40 volumes of filler per 100 volumes of rubber; the base mix is an Altax-Zimate compound with 2.75% of sulphur on the rubber. The Dixie Clay series was repeated with 3% sulphur with Altax alone and with low sulphur (0.75%) with Altax-Zimate. Samples of each were cured for various lengths of time. The tear resistance was determined by two methods, the Crescent Tear Test and the Tongue-Shear Tear Test. Each mix was tested also for tensile strength, % elongation at break, and modulus at 300 and 500% Detailed results are shown in tables and graphs. Among the conclusions summarized one outstanding fact is that when compounding for tear resistance it is best either to load heavily or to use as nearly as possible pure gum.

"Technical Books of All Publishers." Chemical Publishing Co. of New York, 148 Lafayette St., New York, N. Y. This 128-page catalog is indexed by subject matter and will act as a ready reference as to technical books available. A charge of 10¢ is made to cover mailing expense.

"The Goodrich Almanac for Farm and Home. 1937." The B. F. Goodrich Co., Akron, O. In 64 pages in addition to the standard data found in most almanacs this one contains information regarding the use of rubber on the farm; prevention of accidents; and an enumeration by J. D. Tew, Goodrich president, of farm products used in connection with rubber manufacture.

"P&H Hoists." The Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis. Profusely illustrated with more than 25 industrial application photographs, Bulletin No. H-5 describes the added advantage in handling "off-the-floor." It contains the treatment of both general and specific problems in the industrial handling field as well as many diagrams which explain simplified construction and operation, together with other vital points in modern hoist design. The bulletin lists the ratings and operating ranges for hoists from the hundred-pound capacity to fifteen-ton capacity sizes, as well as specifications and electrical accessories.

"Glossary of Terms for Rubber Manufacturers." The Stamford Rubber Supply Co., Stamford, Conn. This 28-page booklet, a second edition, defines various terms used in the rubber industry and embodies the practical uses of Factice for the rubber worker.

"Monsanto Current Events." Monsanto Chemical Co., St. Louis, Mo. The February issue of this house organ contains an interesting account regarding the chemical pioneering activities of Justus von Liebig. Short articles are included concerning abrasives and phosphoric acid and phosphates.

"Francke Flexible Couplings." John Waldron Corp., New Brunswick, N. J. Catalog No. 50 in 12 pages presents the line of flexible shaft couplings, illustrating important changes recently made. These couplings were designed to meet the demand for a resilient coupling to compensate for misalinement of direct connected machines.

"Technical News Bulletin of the National Bureau of Standards, Washington, D. C., February 1937. No. 238." The bulletin contains short technical articles on various unrelated subjects and mentions a research paper reprint RP936, "Change of Volume of Rubber on Stretching: Effects of Time, Elongation and Temperature," Wm. L. Holt and Archibald T. McPherson. This reprint is now available for 5¢.

"Bulletin of the Hamburg World Economic Archives." Published semi-monthly. Vol. III, No. 3, December 1, 1936, 7 pages; No. 4, December 15, 1936, 13 pages. These bulletins give a brief survey of Germany's recent economic development and present several short articles dealing with the effect of some recent activities upon the economic conditions in Germany. These issues also give (in German) reviews of books and articles on economic subjects.

The December 1 issue touches on female labor in industry, building activities, non-ferrous metals and the trade boom, unemployment, cooperative societies, and competition regulation with reference to foreigners.

Issue No. 4 deals with foreign trade and its effect upon work creation, employment, covering raw material demand of a definite character and the future structure of the world economic system. It includes articles on "Man versus Machine," "Fidelity of Contract and the Public Benefit," and "From the Struggle against Unemployment to the Securing of Sufficient Workers."

"Witcombings." Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, N. Y. The February issue includes pictures taken during the development of the site and installation in the company's Texas plant. It also contains industrial facts worth knowing and an article entitled "The Reason Why in Industrial Design."

"Hodgman." The Hodgman Rubber Co., Framingham, Mass., has issued a new 20-page catalog presenting its 1937 line of sport clothing, including the safety swimming belt and safety vest, and its air beds and air rafts. The catalog is well illustrated.

"Index to A.T.S.M. Standards and Tentative Standards. January, 1937." American Society for Testing Materials, Philadelphia, Pa. Paper, 6 by 9 inches, 118 pages. This index is designed to be of service to those interested in ascertaining if the American Society for Testing Materials has issued any specifications, methods of testing, recommended practices, or definitions on a specific subject in the field of engineering materials and the allied testing field. The index contains many references to standards set up for rubber products under the following headings: Adhesive Tests; Aging Tests; Belting; Cable; Rubber Products; Tape and Tension Testing. Many other references to rubber appear.

"Apparatus for Hydrogen-Ion Concentration (pH) Measurements in Laboratory and Plant." Leeds & Northrup Co., 4934 Stenton Avenue, Philadelphia, Pa. This 32-page catalog (EN-96) presents information regarding the value of acidity-alkalinity determination and fundamental principles regarding the relation of acidity to H-ion concentration, the pH scale and the measurement of pH. The catalog describes and lists the latest forms of L&N electrodes, potentiometers, a potentiometer-electrometer and galvanometers for determining the pH of aqueous solutions for research and analytical purposes in the laboratory and for process control in the plant. For the latter purpose, equipment is described for spot tests and for continuous recorded measurement, which, in the case of certain specific processes, leads to continuous recorded measurement with automatic control. Data on applications, advantages, limitations, useful ranges, limits of error, potentials, etc., simplify the selection of electrodes, potentiometers and galvanometers required.

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BOOK REVIEWS

"The Accelerated Vulcanization of Rubber." Torbjorn Grennus. This 120-page treatise, submitted to the Royal Technical College in Copenhagen, for a degree of Doctor Technices, discusses the structural and chemical formation of rubber and summarizes the various theories of the mechanism of vulcanization and the part played by accelerators, especially dithiocarbamates and thiuram sulphides.

The series of physical and chemical investigations recorded in this treatise are divided into five headings: (1) Technique; (2) Experiments with Related Accelerators; (3) Influence of Some Metal Oxides on Vulcanization with Thiuram Disulphides, (4) Effect of Protein (Glue) and Water on the Process of Vulcanization and the Vulcanizate; and (5) Summary. The technique used in preparing and testing the samples is described in detail. Schopper ring test pieces were used for the various tensile and elongation tests. The Shore Durometer was used for the hardness determinations, and the Schopper-Martens apparatus was used for the abrasion tests. The development of the new method for determining the resistance to tear is discussed quite fully. During vulcanization there are many simultaneous reactions going on; so by varying slightly the composition of the accelerator, as covered in division (2) and the employment of retarders and activators, as covered in division (3) and by studying the influences of a dispersing agent as covered in division (4), Grennus has added many new facts to the knowledge of vulcanization.

A section of the report deals with the practical application of glue in rubber stocks. These uses were suggested by the results of the work done under (4). Some desirable characteristics are the increase in the resistance against oil and abrasion, and the softening effect in the unvulcanized rubber so as to facilitate compounding, calendering, extrusion operations, etc.

Through the treatise there are a great many references.

"Foreign Commerce and Navigation of the United States. 1935." United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C. Cloth, 9½ by 11¾ inches. 752 pages.

Four hundred and seventy-eight of the 696 pages of statistical tables are taken up with exports and imports by articles and countries and 228 pages are devoted to articles and customs districts.

There are many references to rubber, crude and manufactured. On page 59 the tables show the amount and value of imports of crude rubber and latex, according to countries. British Malaya and Netherland India supply the bulk. The tables on pages 60 and 61 show the amount and value of reclaim and manufactured rubber goods under various article headings imported from various countries. The same data as above, but listed according to the customs district through which these articles come into the United States, are recorded on pages 299 and 300.

The tables on pages 389 to 394 show the quantity and value of many individual manufactured rubber items exported to various countries including reclaim, automobile cloth, footwear, tires and tubes, sundries and mechanicals. The same data, arranged according to customs districts, are shown on pages 571 to 573.

Two tables on pages 523 and 524 give the total amount and value of rubber compounding ingredients (the one general heading includes accelerators, retarders, etc.) shipped to various countries. Similar tables according to customs districts are shown on page 627.

Many of the summary tables give data from 1929 to 1935, concerning reclaim, rubber chemicals and rubber, crude and manufactured.

"Rubber Producing Companies—1937." The Mincing Lane Tea & Rubber Share Brokers' Association, Ltd., Plantation House, Mincing Lane, London, England. Published in January, 1937, by *The Financial Times*, 72 Coleman St., London. Annual. Stiff boards, 5½x8¼ inches, 583 pages. Price 7/6.

This alphabetical listing of companies producing crude rubber, including a list of directors and secretaries, shows the financial structure, acreage, crops, profit and dividends, standard assessment, and other relevant information.

The preface points out several existing conditions: the accomplishment of two purposes of the Rubber Regulation Scheme; the reduction of excessive stocks and the raising of the price to a remunerative level; inclusion of control and assessment of Dutch East Indies as from January 1, 1937; production and consumption on a higher basis and absorption taking all rubber being produced; cost of production should not increase unduly and will probably be found to range from 4½¢ to 5½¢ per pound "all-in"; desirability for amalgamation of rubber companies to effect economies in overhead and management; costs per pound should not greatly increase in view of larger crops.

"The Rubber Book." William Clayton Pryor and Helen Slomon Pryor, Falls Church, Va. Cloth, 100 pages. Price $1.00.

A photographic picture book with text on a portion of each left-hand page relating to an illustration on the corresponding right-hand page tells and illustrates a story in simple words that a child can understand and in pic-

(*Continued on page 76*)

Rubber Industry in Europe

GREAT BRITAIN

Rubber Street Paving

Immediately after the coronation 3,000 square yards on Cornmarket St., Oxford, will be paved with Gaisman rubber blocks. This work, by Universal Paviors, Ltd., will cost the city nothing and is by way of a test preliminary to a more important undertaking, paving High St. with rubber blocks.

The desirability of reducing vibration to a minimum and thus preventing as far as possible damage from this cause to the many ancient buildings for which Oxford is famous has for some time received the consideration of the authorities, and if the test proves successful, work will proceed on High St. and later possibly on other well-known streets in Oxford. Funds for paving High St. were made available by the Federated Malay States Government, which in 1935 offered, through the Rubber Growers' Association, a grant of £10,000 for the purpose. However this sum would not cover the expense of surfacing both High St. and the section on Cornmarket St. as the bricks for the latter alone will cost £7,500. The Rubber Growers' Association will, therefore, contribute an additional £4,500, provided £3,000 out of the above-mentioned £10,000 is spent now for Cornmarket St.

Much attention is now being paid here to road construction and road safety in general. Among the recent recommendations by the Minister of Transport was a suggestion that roads be marked in a permanent manner. This should help to extend the use of rubber paving blocks with light-colored top layers, if rising prices of rubber do not interfere. This consideration of price, by the way, may arrest the spread of the use of white rubber road studs. These studs, four inches square and white in color, are clearly visible in the daytime. They seem very serviceable so far and have been rendered still more efficient by being fitted with red reflectors. Studs of this new type have been laid at a crossing at Durnsford Rd., Wimbledon Park, S.W. It is said that at night they look like a line of fire when they reflect the light from the cars passing back and forth. To prevent the reflectors from being clogged with mud, they are made to sink into rubber pockets when traffic passes over them, any mud being thus immediately wiped away.

Apropos of rubber for roads, a new form of road construction, claimed to be cheaper than any other in which rubber is used has been invented by A. E. H. Dussek. According to *The Surveyor,* in which the system is described, Mr. Dussek uses a special composition of rubber and bitumen in the form of a loose material that can be dumped on to any sound road bed, raked, and rolled in the same way as asphalt, and is ready for traffic as soon as it is cold. This material, called Rubrmatic, can be laid at any time of the year and is compressed under rollers into a firm, compact carpet with a rough, non-skid surface that wears rough all through.

A variety of advantages are claimed for roads constructed with this material, among others, resilience, noiselessness, durability, and the non-skid quality mentioned above; while the cost is said to be the same or very little more than for asphalt roads.

Elastic Webbing Industry

The fifth census of production covering the elastic webbing trade during 1935 shows the total output valued at £1,975,000, against £1,930,000 in 1934. Figures include elastic cords and braids to a value of £420,000, against £479,000; elastic webbings up to two inches wide, £491,000, against £478,000; similar webbings over two inches, £434,000, against £363,000; braces, suspenders, belts, etc., £81,000, against £90,000; surgical materials and supplies, £106,000, against £115,000; other elastic goods, £221,000, against £199,000. The industry used 1,616,000 pounds of rubber, against 1,566,000 pounds in 1934, besides 4,875,000, against 4,597,000 pounds of cotton yarn; 8,600 pounds against 8,900 pounds of silk yarn; 1,372,000 against 1,344,000 pounds of artificial yarns; and 30,300 against 19,900 pounds of woolen yarn. The average number of employes during 1935 came to 6,527 against 6,503 the year before.

Rubber Research

The growing importance of rubber for various structural purposes, whether for dwellings and office buildings or for ocean liners, has concentrated attention on the need of rendering it as fireproof as possible. The first systematic investigation ever to be made of this problem has just been carried out by the Research Association of British Manufacturers which has succeeded in producing materials which will not burn unless continuously kept in a fierce flame, according to the 1935-1936 report by the Department of Scientific and Industrial Research.

The same source reveals that certain rubbers, for instance tan shoe soles and heels, show much greater resistance to wear on the edge surface than on the flat tread. This, it appears, is due to the fact that there is in the rubber a kind of grain like that of wood, for instance. Now methods have been devised by which advantage can be taken of this property to increase the life of footwear by reversing the direction of the material in the process of manufacture so that the wearer treads "against the grain," so to speak.

Hardness testing has received much attention from the association especially in connection with the effort of the rubber industry to establish a standard hardness test for rubber materials which will be generally recognized by the entire industry. In collaboration with the Electrical Research Association an extensive investigation has been carried out on the effect of varying proportions of rubber and sulphur and of different curing conditions on the mechanical, electrical, and chemical properties of hard rubber. Furthermore a special ebonite has been developed which largely retains its electrical properties while showing exceptional resistance to heat.

Investigations to determine the effect of water on the lubricating value of motor oil showed that even 0.02% of water reduced the seizing temperature by 15 to 20° C. and caused an increase in minimum friction. A commercial type of octagonal rubber bearing with water lubrication is also now being tested. In connection with work on chlorinated rubber, an interesting product was obtained by incorporating in phenol formaldehyde resins milled rubber chlorinated at –40° C. by means of liquid chlorine. The resulting material is said to have insulating properties superior to wood-meal phenol formaldehyde resin moldings.

British Industries Fair

A number of highly effective stands of different rubber companies were seen at the latest British Industries Fair held at Olympia. Among the rubber novelties that attracted attention were a new Dunlop gymnasium mat of strips of crumb rubber reenforced with hessian and, by the same firm, hard rubber bowls said to be more accurate and less subject to wear than other kinds.

Ucrete, a combination of latex and concrete, intended to replace wood and composition materials, was shown by F. Hulse & Co., Ltd. This is a waterproof material that can be cut, sawed,

bored, drilled, molded, or cast in sheet or slabs. It may also be combined with ground cork.

The Malayan Information Agency exhibited a new rubber plastic of Dunlop's known as Semtex.

GERMANY

Recently issued figures for Germany's rubber business during 1936 reveal decreased imports of balata and gutta percha, but substantially increased imports of crude, waste, and old rubber, particularly conspicuous toward the year-end. Total crude rubber imports for 1936 were 734,150 quintals against 651,352 quintals in 1935; for December, 1936, the figure was 75,807 quintals against 49,302 in December, 1935. The waste rubber imports were 87,561 against 77,123 quintals; gutta percha, 972 against 1,201 quintals; and balata, 3,974 against 5,784 quintals.

While imports of manufactured goods dropped in quantity from 52,326 to 31,368 quintals, the value increased from 4,172,000 to 4,281,000 marks. On the other hand the substantial increase from 141,222 to 168,951 quintals in the quantity exported was accompanied by only a small rise in value, from 39,495,000 to 41,229,000 marks. Considering the rise in the price of raw materials, it would appear that German manufacturers worked on a very low margin of profit. Imports of manufactured rubber show practically a complete cessation of purchases of cycle tires and tubes from foreign countries, but a very marked rise in those of automobile tires and tubes, which came to 62,678 against 18,625. However about 10% of the 1936 quantity of automobile tires and tubes consisted of returned goods, and more than half the total was made up of old, worn tires which really should be classed with raw materials. Tire imports from Japan (apparently new goods) showed the greatest individual increase. Imports of elastic goods fell from 38,687 to 11,851 quintals; also footwear, which came to 11,011 against 15,451 pairs, the former including 8,488 pairs of returned goods.

Practically all exports rose. Automobile tires numbered 271,527 against 188,001; tubes, 145,171 against 107,812; cycle tires, 1,003,902 against 933,148; tubes for cycles, 990,622 against 760,814. The best customers for automobile tires and tubes were Netherlands, British India, and Denmark; but the Netherlands bought fewer cycle tires and tubes, and there was also a decrease in cycle tires to India. German exports of all kinds of tires and tubes to Netherland India declined considerably during 1936, probably because of the establishment of the Goodyear factory in Batavia. On the other hand several countries in eastern Europe and South America greatly increased their business with Germany, not only in tires and tubes, but also in belting (total exports 3,333 against 1,898 quintals). Footwear exports decreased slightly from 334,387 to 333,307 pairs; the difference was largely due to a heavy decline in shipments to Netherlands and Belgium, which the increased shipments, especially to Brazil and Chile, failed to offset completely.

The Dechema, Deutsche Gesellschaft fur Chemisches Apparatewesen (German Society for Chemical Engineering), which is organizing and promoting the Achema VIII, Chemical Engineering Exhibition, to take place July 2 to 11, 1937, on the occasion of the National Congress of German Chemists in Frankfurt a.M., reports that up to January 15, 1937, 275 important firms of the German chemical plant, equipment, and accessories industry had rented net floor space for exhibition purposes totaling about 105,000 square feet. At the same date in 1934, when preparations were being made for the Achema VII at Cologne, only 200 firms had rented 52,000 square feet of floor space, a sufficient indication that the present Achema should be very successful.

The winter meeting of the Dechema was held jointly with the Fachgruppe Apparatebau (Industrial Group of Plant and Equipment Manufacturers) on March 12, 1937, in Berlin. Several well-known scientists discussed various problems pertaining to chemical engineering.

Austrian Editor

Carl Magnus, editor of *Gummi und Asbestzeitung,* Vienna, Austria, now on a world cruise, expects to arrive in the United States, on the Pacific Coast, early in May and will reach New York, N. Y., May 25, on the *S.S. Reliance.*

Mr. Magnus was born in Hanover in 1872, the son of the founder of the Continental-Caoutchouc Cie. After completion of his schooling, in 1889, he joined Continental company as a beginner. Two years later the firm sent him as its representative to its factory in Luettich, Englebert Fils & Co. Later he was made general representative of the latter company for Belgium, with Brussels as headquarters. Here he remained two years. After a three months' residence in London, England, Continental sent Mr. Magnus to America as its agent, where he remained from 1897 to 1899. Thereafter in succession he was sales director at the Englebert factory, director for four years of a German rubber factory in Dresden, and then accepted a call to Vienna, Austria, in the middle of 1904, to take over the direction of a newly established trust of the Austrian Hungarian Rubber Goods factories.

Carl Magnus

During the World War, Mr. Magnus served four and a half years in the German army and at the close of the war again took over the direction of the aforementioned trust, holding this position for 30 years until the dissolution of the union. He has been instrumental in establishing a great many other trusts and has directed others as well, as for instance, the International Asbest Syndicate, the German-Austro-Hungarian Tire Syndicate, the Union of the Austro-Hungarian Oilcloth ("Wachstuch") Factories, the Union of the Austro-Hung. Bandage Factories, Union of the Austro-Czech. "Stopfbuechsenpackungs" Factories, and in the last years, the Trust of the Hungarian Rubber factories. He was also on the board of directors of the Central Union of Austrian Industry.

EUROPEAN NOTES

The greater part of Finland's production of rubber goods consists of footwear and accessories, and in 1935 output came to 2,200,000 pairs of shoes and 19 tons of soles and heels. But headway is also being made in other directions, and the varied list of rubber goods shows 14,175 dozen rubber balls, 830,580 cycle tires and tubes, 14,585 automobile tires and tubes, 1,389 tons technical rubber goods, 154 tons balata and rubber belts, 9 tons packing and raincoats, to a value of 1,400,000 finmarks. The total output had a value of 171,000,000 against 123,300,000 finmarks the year before, or an increase of 39.9%. Altogether the Finnish rubber industry employed 2,072 workers, of whom 1,400 were women.

The most important rubber manufacturing concern is the Finska Gummifabriks A.B. Nokia, capitalized at 63,000,000 finmarks. In 1935 the firm increased sales from 112,000,000 to 147,500,000 finmarks; while net profits rose from 7,300,000 to 13,800,000 finmarks. Lately the concern acquired a controlling interest in the Kumiteolisuus O.Y., Tammersfors. The latter firm for some time reported unsatisfactory business. Some years ago its capital was reduced to 4,500,000 finmarks. In 1935 sales represented a value of 20,300,000 against 19,100,000 finmarks, but the increase failed to prevent another loss, which with those from preceding years brought the total loss to 4,500,000 finmarks.

According to reports from Turkey, it

(*Continued on page* 74)

Rubber Industry in Far East

MALAYA

One Planter's Viewpoint

That well-known planter, O. Rasmussen, recently in print again, in his usual blunt and outspoken manner made several provocative statements anent the present rubber situation. Few, if any planters, will agree with him on all he has to say, but enough share his opinion on each of his statements to make them worthwhile quoting. To begin with, he holds that the violent fluctuations in the price of rubber which have been experienced in the last 10 to 12 years are caused by the bluff of the American rubber manufacturers. By their bluff they succeeded in depressing prices unnaturally in 1924-1925 and had to pay for this in the boom that followed, and they have done the same kind of thing now. In 1932, he says, American manufacturers gave out that American stocks were around 650,000 tons; whereas he had inside information that the figure was nearer 350,000 tons, and made this known at the time. Later the manufacturers used every means in their power to depress the market, even employing a well-known scientist to study conditions in the Far East and spread the report of huge potential outputs, their aim being to force rubber companies into bankruptcy and to make rubber production a purely native industry. In this way they succeeded in causing the price of rubber to drop until the unheard-of price of 1d. per pound was reached. But producers were striving to protect themselves against this destructive force; and if, as a consequence, prices boomed, it was not their fault, but solely that of the American manufacturers who by their propaganda had brought things to this pass.

Mr. Rasmussen holds that rubber is cheap at 1s. a pound and that without the organized depression formed in America, rubber would never have gone much below that price. Big Malayan producers are partly to blame for the "scandal," he says, because they boomed the budded rubber stunt. Mr. Rasmussen is definitely against budded rubber and is convinced that budded trees will never be able to maintain, even if they reach, the high yields that it has been boasted they are capable of giving. It is his contention that budded trees are tapped too soon. He states that he has seen much budded rubber seven to nine years old in various districts, and while he admits that the young trees yield more than seedlings of the same age, he doubts whether these crops can be kept up as growth of bark and bark renewal on buddings are inferior to what is customary with seedlings. Because of this condition, buddings should be allowed a longer time to mature before tapping is commenced. In judging tappability, he says, thickness of bark and not age should be the criterion. At present buddings are tapped when the bark is only ¼-inch thick; and he saw many trees tapped when the bark was only $\frac{3}{16}$-inch thick. If this practise continues, he foresees much disappointment; it is only by refraining from tapping bark until it is at least ⅜-inch thick that buddings can be saved.

With reference to export releases, he states that the International Rubber Regulation Committee may safely release 100%; it will make no difference at all, as the world cannot possibly produce 100% of the quota. Indeed it will be a piece of luck if Malaya can produce the permissible percentage during the first half of 1937, he says, and offers as his reasons first the fact that if budded rubber is given a fair start in life, none of it will be in tapping until another eight years or so; then there is the question of deterioration of rubber on many of the older estates, and over-assessment.

Importance of the Labor Problem

Personally we are inclined to look for the main obstacle to increased production in his last reason—shortage of labor. Whether we agree that the trees can produce all the rubber that it is claimed they can, the fact remains that Malaya has not the necessary labor to get the rubber out, granted that it is there. For Malaya must import her labor, and in the circumstance the sudden ups and downs to which all business is subject at one time or another, here tends to have a much greater disorganizing effect in regard to labor than is the case where there is adequate indigenous labor available.

During the depression large numbers of Indian and Chinese coolies who had been allowed to enter in better times had to be returned to their respective homelands, and immigration of Chinese in particular had to be severely curtailed. Then when business improved again, and especially when restriction was introduced, a sudden shortage of labor occurred; immigration rulings were relaxed and quotas for Chinese immediately increased to ease the situation, but in the meantime production had been hampered.

Now there is a sudden rise in the rubber quota, causing a burst of activity on estates, in fields, factories, smokehouses, packing and storing rooms, which not only disorganizes estate routine and puts a tremendous strain on staff and labor alike, but causes a new shortage of labor, especially on those estates which are not able to maintain an adequate labor force under all conditions. It is proposed to raise the quota for Chinese immigrants again; but apart from the delay, there is the uncertainty that a sufficient number of the right kind of coolies for estate purposes will be able to immigrate. In any event, there is the fact that meantime production lags.

Just at present it is not only a shortage of labor that is causing production to fall behind. The unexpected demand for rubber is in a good many cases bringing home to producers the fact that their machinery is out-of-date. During the slump there was, of course, no thought of improving machinery, and hitherto existing equipment was able to meet demand. But now more than one estate must be facing the need for better machinery. Again estates suddenly find that the quantity of supplies to which they have become accustomed in a given time is far below what they now require: they must have more latex cups, more coagulant, more packing cases, more of everything, and where local dealers have run out of supplies—which is not unusual—many weeks must elapse before orders can be filled. Of course all this is accompanied by a considerable rise in prices, not all due to the demand from the rubber industry.

INDO-CHINA

A new export tax, which varies according to the price of rubber, is to be levied by the Government of Indo-China. The minimum tax of 0.25-cent will be levied when the price of rubber is below 0.30-piaster per kilo, and the maximum at present is placed at 3.75 cents when rubber is 0.90 to one piaster. (Piaster equals about 50¢ U.S. currency). Exporters already pay a tax to cover among other things the cost of administration of the rubber bureau here and in Paris, besides contributions to the I.R.R.C. in London and to the Institut de Recherches et de la Propaganda. This tax at first was 1.50 piasters per 100 kilos, but was raised to

two piasters and then to three and will probably be increased again shortly. Both these taxes are payable by exporters. Starting January 1, 1937, producers become liable to a tax through which they pay back the subsidy granted to them during the period November, 1930, to March, 1934. The exact amount has not yet been determined, but will depend on the difference in the average cost of production and the average price of rubber on the London market and will be payable quarterly.

During 1936 Indo-China exported 41,485,468 kilos (91,378,000 pounds) of rubber against 29,505,136 kilos in 1935. During December, 1936, the record total of 8,633,256 kilos was shipped. The average monthly shipments in the preceding five months had been about 3,500,000 kilos, and for the first half of the year, 2,600,000 kilos. The rapid rate at which output has increased in these parts during the last ten years is illustrated by the fact that in 1926 the exports for the whole year were 8,942,070 kilos, which is but little above the figure for the last month of 1936. Of course this figure is almost phenomenal, but still it is an indication that forecasts that Indo-China's output by 1942 will reach 80,000 tons are by no means exaggerated.

Despite the rapid growth of the rubber industry here, very little latex is shipped. Test shipments have been made to France, and the quality of the latex has been pronounced good, but the cost to producers were excessive because the country is not yet equipped to ship latex in bulk. Lately efforts have been made to stimulate the interest of planters in the bulk exportation of latex. It has been pointed out that though France in 1935 absorbed about 10,000 tons of latex, this had to be purchased from foreign sources.

CEYLON

Ceylon's basic rubber quota for 1937 has been put at 81,000 long tons, and the total permissible exports for the first half of the year amount to 31,387½ tons. The latter amount compares with 26,000 tons permissible for the second half of 1936 and 24,000 tons permissible for the first half of 1936. As originally fixed in October, 1936, permissible exports for Ceylon for the first half of 1937 were 28,350 tons, over 3,000 tons under the revised figure.

The amount of rubber actually exported from Ceylon during 1936 came to 50,148 long tons, against 53,384.

According to reports circulating here, Germany is investigating the possibility of initiating barter trade with Ceylon. It seems that Germany would like Ceylon to accept machinery, radios, electrical goods, etc., in exchange for rubber, coconuts, plumbago, and a limited amount of cocoa.

NETHERLAND INDIA

Export Statistics

Rubber exports from Netherland India during December, 1936, totaled 27,830,938 kilos (61,300,000 pounds) dry weight according to final figures of the Central Bureau of Statistics. Of this amount Java and Madoera shipped 6,591,176 kilos, including 15,195 kilos of latex. In addition Java sent 10,724 kilos in the form of tires. Estates in the Outer Provinces shipped 12,491,189 kilos (27,513,000 pounds), including 861,560 kilos of latex; while natives exported 8,738,849 kilos.

Industrial Activity

The Goodyear factory at Buitenzorg, Java, is to be expanded to double its present capacity. At the new factory, expected to be ready in six months' time, the production of cycle tires will be undertaken on a much more extended scale, and as a new departure tires for small vehicles, as dog-carts, will also be manufactured. Hitherto exports of cycle tires have been limited, but it is expected that with the new facilities to be made available, this business will be very considerably increased. The chief markets on which exports are to be concentrated will be Netherlands, Brazil, British India, and China.

The Netherland India Government has earmarked 150,000 guilders for 1937 and 25,000 guilders for each of the years 1938 and 1939 for the erection of a factory for rubber footwear, probably in Jogja, Java. At present about seven tons of rubber footwear are imported annually, and it is considered that not only could these goods be produced here at least as cheaply, but that the establishment of such a factory would provide much work, especially as handwork plays such an important part in this kind of manufacture.

At the same time it is learned that Bata is contemplating erecting a footwear factory near Buitenzorg. Although Bata is also negotiating with Singapore, there seem to be reasons to believe that he will give preference to Buitenzorg. If Bata or any other private concern really intends to manufacture rubber footwear here and comes to an early decision, the government will give up its own plans regarding the manufacture of footwear. While government has in mind only the supplying of local needs, a private concern would, of course, also operate for export, whereby a greater field for the consumption of local rubber would be opened. Of course rubber which leaves the country in the form of manufactured goods is not subject to restriction.

Mention may also be made of rumored efforts to establish a chemical industry in Java. It seems that plans are afoot to establish chemical works around Bandoeng. According to newspaper reports, Dr. R. F. A. Altman and J. O. vanden Berg have recently submitted to the government a detailed memorandum stressing the possibility and the desirability of a chemical industry here, and the hope was expressed that government itself would take an active part in the exploitation of the contemplated works.

Forward Contracts

The recent spurt in the price of rubber came so suddenly that many large rubber companies were unable to benefit to the full as they had already sold forward large amounts of rubber at the earlier and lower rates. Thus the Radjamandala company sold forward out of crop 1937, 105 tons of standard sheet at the average price of 29½ guilder cents per half kilo; Bodjong Datar sold 336 tons of standard sheet out of 1937 crop at an average of 27 guilder cents per half kilo; Tjilentab obtained 25.6 cents per half kilo for 126 tons of standard sheet out of crop 1937. On the other hand Kali Tello was able to sell forward 580,000 half kilos out of an estimated total 1937 crop of 1,760,000 half kilos, at a price of 45½ guilder cents per half kilo.

SOUTH AFRICA

The importance of rubber in mining was stressed in a paper read recently in Johannesburg at a conference called by the Rubber Growers' Association and attended by a number of mining officials. Rubber was indispensable in mining, it was pointed out, and without it, mining technique and development would have been startlingly different.

Motorized 60-Inch Mill

(*Continued from page* 57)

The jack shaft has three 6- by 13-inch babbitted bearings of the removable sleeve type, which are provided with oiling rings and designed to be interchangeable. The pinion shaft has two 4⅞- by 10-inch babbitted lined bearings also of the removable sleeve type and is connected to the motor by a flexible coupling.

The safety equipment operates electrically through an adjustable hand operated overhead lever which opens a switch so as to cut off the current and trip the automatic brake to stop the rolls instantly. The motor cannot be started until the automatic brake has been reset by hand. This safety equipment is guaranteed to pass the New Jersey State law requirements, the National Safety Code, and the insurance companies' standards. W. R. Thropp & Sons Co., Trenton, N. J.

Patents and Trade Marks

MACHINERY

United States

2,068,976. **Viscosimeter.** J. H. Dillon, Bellerose, assignor to Charles J. Tagliabue Mfg. Co., Brooklyn, both in N. Y.

2,069,087. **Insulated Wire Apparatus.** E. W. Forstrom and C. O. Hull, both of Stratford, Conn., assignors to General Electric Co., a corporation of N. Y.

2,069,090. **Tire Retread Vulcanizer.** P. E. Hawkinson, Minneapolis, Minn.

2,069,197. **Hose Curer.** N. H. Curtiss, Passaic, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,069,589. **Pavement Vulcanizer.** J. Meijling and T. Magnusson, both of Gothenburg, assignors to Kooperativa Forbundet, Forening U. P. A., Stockholm, all in Sweden.

2,069,746. **Denture Processing Device.** C. M. Andrews, York, Neb.

2,069,907. **Tubular Rivet Installer.** H. E. Waner, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,070,032. **Elastic Stop Nut Apparatus.** C. A. Swanstrom, Irvington, assignor to Elastic Stop Nut Corp., Elizabeth, both in N. J.

2,070,388. **Tubing Apparatus.** S. W. Alderfer, assignor of ½ to E. D. Andrews, both of Akron, O.

2,070,525. **Inner Tube Apparatus.** B. C. Eberhard, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,070,731. **Elasticity Measurer.** H. Henning, assignor to R. Knote, both of Leipzig, Germany.

2,070,989. **Reconditioning Tennis Ball Mechanism.** H. D. Jamieson, Los Angeles, Calif.

2,071,048. **Treating Plied Sheet Material.** F. S. Sternad, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,071,097. **Cutter.** O. Wennberg, Laurelton, A. E. Wegner, Flushing, C. C. Spadone, Rockville Centre, all in N. Y., assignors to Spadone Machine Co., Inc., a corporation of N. Y.

2,071,289. **Knitting Means.** E. R. Pace, Belmont, N. C., assignor, by mesne assignments, of ½ to Ragan Knitting Co., and ½ to Maurice Mills Co., both of Thomasville, N. C.

Dominion of Canada

363,662 and 363,663. **Rubber Article Joiner.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of H. Willshaw and H. Smith, co-inventors, both of Birmingham, England.

363,775 and 363,776. **Continuous Vulcanizer.** A. L. Wallace, Brooklyn, N. Y., U. S. A.

363,827. **Textile Roll Storage Apparatus.** Dunlop Rubber Co., Ltd., London, assignee of H. Willshaw, Birmingham, both in England.

363,903. **Elastic Thread.** S. W. Alderfer, inventor, and E. D. Andrews, assignee of one-half of the interest, both of Akron, O., U. S. A.

363,997. **Artificial Leather Apparatus.** Paper Patents Co., assignee of E. Mahler, both of Neenah, and J. B. Catlin, Appleton, co-inventors, all in Wis., U. S. A.

364,088. **Electric Vulcanizer.** A. Hoving, Calgary, Alberta.

364,090. **Coffer Press.** A. Kampfer, Berlin-Charlottenburg, Germany.

United Kingdom

452,088. **Sponge Rubber Sheets.** United States Rubber Co., New York, N. Y., U. S. A.

452,779. **Covering Cores.** Standard Telephones & Cables, Ltd., W. K. Weston, D. Nunn, and M. C. Field, all of London.

Germany

641,685. **Mixer.** A. Lasch, Stuttgart-Bad Cannstatt, and E. Stromer, Stuttgart.

641,686. **Safety Device.** Harburger Gummiwaren-Fabrik Phoenix A.G., Harburg-Wilhelmsburg.

PROCESS

United States

2,068,706. **Shoes.** E. J. Ray, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,069,362. **Fabricated Belt Splice.** F. H. Ford, assignor to Shaler Co., both of Waupun, Wis.

2,069,753. **Floor Covering.** J. C. Emhardt, Orange, Conn., assignor to Sidney Blumenthal & Co., Inc., New York, N. Y.

2,070,251. **Impregnated Pile Fabric.** W. F. Bird, Springfield, assignor to Collins & Aikman Corp., Philadelphia, both in Pa.

2,070,366. **Doll Head.** M. S. Lower, Wadsworth, assignor to Sun Rubber Co., Barberton, both in O.

2,071,065. **Soles.** W. D. Everett, Watertown, and I. F. Starner and F. F. Olson, both of Belmont, assignors to Hood Rubber Co., Watertown, all in Mass.

Dominion of Canada

363,732. **Conductor Insulating Process.** Vega Mfg. Corp., Wilmington, Del., assignee of S. Ruben, New Rochelle, N. Y., both in the U. S. A.

363,752. **Cord Fabric.** W. Coverly, Detroit, Mich., U. S. A.

363,892. **Rubber Bonded Abrasive Article.** Norton Co., assignee of D. E. Webster, both of Worcester, Mass., U. S. A.

364,073. **Rotary Object Balancing Method.** Wingfoot Corp., Wilmington, Del., assignee of A. L. MacCraken, Akron, O., both in the U. S. A.

364,295. **Rubber Bonded Abrasive Article.** Carborundum Co., a Del. corporation, assignee of Carborundum Co., a Pa. corporation, assignee of C. S. Nelson, all of Niagara Falls, N. Y., U. S. A.

364,302. **Paper Manufacture.** Gardner-Richardson Co., assignee of J. H. Swan, III, both of Middletown, O., U. S. A.

364,372. **Rubber Sheath, Catheter, Etc.** J. Fromm, Berlin-Schlachtensee, Germany.

United Kingdom

452,008. **Cables.** J. T. Shevlin, London. (Siemens & Halske Akt.-Ges., Berlin, Germany.)

452,176. **Coating Webs.** International Latex Processes, Ltd., St. Peter's Port, Guernsey, and E. A. Murphy, Birmingham.

452,205. **Latex Molding by Dipping.** L. Mellersh-Jackson, London. (Heveatex Corp., Melrose, Mass., U. S. A.)

452,362. **Molding Latex.** L. Mellersh-Jackson, London. (Heveatex Corp., Melrose, Mass., U. S. A.)

452,373. **Feeding Webs.** National Cash Register Co., Dayton, O., U. S. A.

Germany

641,929. **Hollow Goods, Especially Balls, Etc.** K. Lehner, Vienna, Austria. Represented by M. Eule, Berlin.

642,204. **Surface Finish on Rubber Goods.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by C. and E. Wiegand, both of Berlin.

642,205. **Soft and Hard Rubber.** Products Kaysam Syndicate, Ltd., London, England. Represented by G. Lotterhos and M. Eule, both of Berlin.

642,224. **Respiration Mask.** Clora Atemschutzgerate Schleich & Co., and Friedrich Schleich, Schwabisch-Gmund.

CHEMICAL

United States

2,068,818. **Coating Composition.** F. B. Root, W. Orange, N. J., assignor to Ellis-Foster Co., a corporation of N. J.

2,068,935. **Rubber Compounding.** A. A. Somerville, Flushing, assignor to R. T. Vanderbilt Co., Inc., New York, both in N. Y.

2,069,053. **Vulcanized Rubber.** J. E. Whittenberg, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,069,151. **Reclaiming Rubber.** J. P. Ioannu, assignor to Pennsylvania Salt Mfg. Co., both of Philadelphia, Pa.

2,069,262. **Chlorinated Rubber.** T. N. Montgomery, Runcorn, England, assignor to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,069,477. **Chewing Gum.** G. J. Manson, Hawkesbury, Ont., Canada.

2,069,828. **Printing Ink.** H. A. Hauptli, Evanston, assignor to Sears, Roebuck & Co., Chicago, both in Ill.

2,070,047. **Chewing Gum.** G. A. Hatherell, Burbank, assignor to F. A. Garbutt, Los Angeles, both in Calif.

2,070,119. **Rubber Color.** E. Fischer, Offenbach a. M., Germany, assignor to General Aniline Works, Inc., New York, N. Y.

2,070,443. **Curing Poly Vinyl Halides.** R. W. McGahey, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,070,521. **Antioxidant.** W. C. Calvert, Cuyahoga Falls, O., assignor to Wingfoot Corp., Wilmington, Del.

2,070,522 and 2,070,523. **Accelerator.** A. M. Clifford, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,070,524. **Accelerator.** H. I. Cramer, Cuyahoga Falls, O., assignor to Wingfoot Corp., Wilmington, Del.

2,070,761. **Mercaptans.** L. Von Szeszich, assignor to Deutsche Gold-und Silber Scheideanstalt, both of Frankfurt a. M., Germany.

2,070,848. **Aliphatic - Aromatic Ethers.** W. L. Semon, Silver Lake, and R. V. Yohe, Akron, both in O., assignors to B. F. Goodrich Co., New York, N. Y.

2,071,214. **Compositions from Latex and Aqueous Dispersions.** U. Pestalozza, assignor to Societa Italiana Pirelli, both of Milan, Italy.

Dominion of Canada

363,661. **Surface Hardening Rubber Articles.** Dunlop Tire & Rubber Co., Ltd., Toronto, Ont., assignee of D. F. Twiss, F. A. Jones, and D. J. Hadley, co-inventors, all of Birmingham, England.

363,698. **Rubber Preservation.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. M. Neal, Pennsgrove, N. J., U. S. A.

363,721. **Rubber Vulcanization.** Monsanto Chemical Co., St. Louis, Mo., assignee of R. L. Sibley, Nitro, W. Va., both in U. S. A.

363,890. **Film Forming Composition.** Marathon Paper Mills Co., Rothschild, assignee of A. Abrams and C. L. Wagner, co-inventors, both of Wausau, all in Wis., U. S. A.

364,074. **Rubber Derivative.** Wingfoot Corp., Wilmington, Del., assignee of T. C. Morris, Akron, O., both in the U. S. A.

364,183. **Coating Composition.** Brown Co., assignee of M. O. Schur, both of Berlin, N. H., U. S. A.

364,340. **Non-Inflammable Plastic Mass.** Imperial Chemical Industries, Ltd., London, assignee of W. D. Spencer, Liverpool, and F. T. Walker, London, co-inventors, all in England.

United Kingdom

452,033. **Coloring Rubber.** I. G. Farbenindustrie Akt.-Ges., Frankfurt a. M., Germany.

452,078. **Chloroprene Compositions.** United States Rubber Co., New York, N. Y., U. S. A.

452,361. **Plastic Compositions.** Henley's Telegraph Works Co., Ltd., London, and B. B. Evans, Gravesend.

452,373. **Rubber Compositions.** National Cash Register Co., Dayton, O., U. S. A.

452,421. **Dye Preparations.** Coutts & Co., London, and F. Johnson, Eastbourne, (Representatives of J. Y. Johnson). (I. G. Farbenindustrie Ak.-Ges., Frankfurt a. M., Germany.

452,438. **Coloring Rubber.** Coutts & Co., London, and F. Johnson, Eastbourne, (Representatives of J. Y. Johnson). (I. G. Farbenindustrie Akt.-Ges., Frankfurt a. M., Germany.

452,441. **Rubber Compositions.** I. G. Farbenindustrie Akt-Ges., Frankfurt a. M., Germany

452,731. **Tanks.** Metallges. Akt.-Ges., Frankfurt a. M., Germany.

452,811 **Indiarubber Compositions.** International Hydrogenation Patents Co., Ltd., Vaduz, Liechtenstein, assignee of H. S. Birkby, Nutley, N. J., U. S. A.

Germany

641,468. **Polymerization Products from Halogenized Butadiene.** E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U. S. A. Represented by C. Deichler, Berlin.

641,801. **Chlorinating Rubberlike Masses.** I. G. Farbenindustrie A. G., Frankfurt a.M.

641,968. **Anti-corrosive and Sealing Material.** Chemieprodukte Komm. Ges., Berlin-Britz.

642,161. **Creaming Ammoniated Latex.** Centrale Vereeniging tot Beheer van Proefstations voor de Overjarige Cultures in Nederlandsch-Indie, Batavia, Netherland India. Represented by G. Weissenberger, M. Schulte-Kemminghausen, E. Heilmann, W. Langewiesche, F. Mathes, and K. Brose, all of Berlin.

642,266. **Stabilizing Non-coagulated Latex.** B. B. Chemical Co., Boston, Mass., U. S. A. Represented by A. Bohr and H. Fincke, both of Berlin.

642,310. **Foam Rubber from Aqueous Rubber Dispersions.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by R. and M. M. Wirth and C. Weihe, all of Frankfurt a.M., and T. R. Koehnhorn, Berlin.

GENERAL

United States

2,068,644. **Shoulder Pad.** S. Frais, London, England.

2,068,714. **Railroad Track.** C. Stedefeld, Hannover, Germany.

2,068,786. **Insole.** T. K. Balaskas, Clay Center, Neb.

2,068,846. **Vehicle Bumper.** M. Critani, Westfield, N. J.

2,068,928. **Door Stop.** S. Paolillo, assignor to Seamless Rubber Co., Inc., both of New Haven, Conn.

2,068,940. **Cable.** R. J. Wiseman, Paterson, assignor to Okonite Co., Passaic, both in N. J.

2,068,947. **Wheel.** F. C. Frank, assignor to Bendix Aviation Corp., both of So. Bend, Ind.

2,068,994. **Cushion Joint.** T. Lord, assignor to H. C. Lord, both of Erie, Pa.

2,068,996. **Shock Absorber.** G. E. Smith, Cincinnati, O.

2,068,997 and 2,068,998. **Baby Pants.** A. N. Spanel, Rochester, N. Y.

2,069,001. **Printing Surface Preparer.** E. S. Ballard, Berkeley, Calif.

2,069,014. **Corselet.** W. M. A. Molyneux-Seel, Paris, France.

2,069,032. **Windshield Molding Assembly.** A. J. Fisher and E. G. Simpson, assignors to General Motors Corp., all of Detroit, Mich.

2,069,034. **Bunion and Corn Protector.** W. J. Hicks, Madison, Wis.

2,069,049. **Shock Absorber.** C. Saurer, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,069,054. **Warning Device.** L. R. Adams, Silver Lake, assignor to Firestone Steel Products Co., Akron, both in O.

2,069,066. **Pedal Pad.** A. S. Harbour, Pontiac, Mich.

2,609,083. **Shoe with Elastic Portion.** P. Adamson, Rye, assignor to United States Rubber Co., New York, both in N. Y.

2,069,119. **Suction Roll.** A. H. Standley, Downington, Pa., and H. H. Burrows, Clifton, N. J., assignor to Downington Mfg. Co., Downington, Pa.

2,069,128. **Tire Valve.** V. O. Blatz, Munich, Germany.

2,069,141. **Metallic and Nonmetallic Member Connection.** W. G. Furlong, Cleveland, O.

2,069,168. **Vaginal Irrigator.** J. A. Kirk, Detroit, Mich.

2,069,212. **Packing Ring.** M. R. Buffington, Millburn, N. J.

2,069,254. **Sound Apparatus.** W. Kunze, Bremen, Germany, assignor to Submarine Signal Co., Boston, Mass.

2,069,256. **Shoe Coater Nozzle.** W. L. MacKenzie, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,069,261. **Feeder.** G. Monnet, Namur, Belgium, assignor to Societe Anonyme des Manufactures des Glaces & Produits Chimiques de Saint-Gobain, Chauny & Cirey, Paris, France.

2,069,270. **Elastic Spring.** E. H. Piron, assignor, by mesne assignments, to Transit Research Corp., both of New York, N. Y.

2,069,295. **Elastic Fabric.** H. W. Wilson, assignor to J. W. Wood Elastic Web Co., both of Stoughton, Mass.

2,069,319. **Sign.** C. E. Lounsbury and R. J. Sheafe, both of Chicago, Ill.

2,069,367. **Rubber Bearing.** A. Hollander, Berkeley, assignor to Byron Jackson Co., Huntington Park, both in Calif.

2,069,391. **Mat.** M. B. Sample, Houston, Tex.

2,069,422. **Pneumatic Mattress.** R. W. Sampson, assignor to C. J. Hardy, both of New York, N. Y.

2,069,442. **Dispenser.** A. Heseltine, Erie, Pa.

2,069,454. **Bicycle Pedal.** B. M. Lofquist and S. J. Olson, both of Fitchburg, Mass.

2,069,455. **Atomizer.** R. F. Massa, New York, N. Y.

2,069,462. **Eraser.** J. H. Rouse, Los Angeles, Calif.

2,069,494. **Measurer.** G. Hurst, Detroit, Mich.

2,069,586. **Inner Tube.** J. Mars, Altamont, Ill.

2,069,619. **Pencil Holder, Sharpener, and Advertiser.** J. Mendelson, Council Bluffs, Iowa.

2,069,643. **Beauty Mitten.** W. Burke, New York, N. Y.

2,069,650. **Golf Practice Indicator.** A. E. Engh, Yorkville, Ill.

2,069,679. **Bicycle.** F. P. Petmecky, Austin, Tex., assignor to American Power-Cycle Corp., Frederick, Md.

2,069,688. **Vehicle Cushioner.** J. J. Tatum, Baltimore, Md.

2,069,699. **Windshield Wiper Blade.** O. H. Dohler, Elmwood Park, Chicago, Ill.

2,069,720. **Composite Flooring Material.** H. C. Harvey, assignor to Agasote Millboard Co., both of Trenton, N. J.

2,069,722. **Pipe Leak Sealing Gasket.** P. D. Merrill, assignor to M. B. Skinner Co., both of So. Bend, Ind.

2,069,764. **Spring Suspension.** V. W. Kliesrath, So. Bend, Ind., assignor to Steel Wheel Corp., Chicago, Ill.

2,069,765. **Shaft Mounting.** M. Kurillo, Washington, D. C.

2,069,849. **Valve Safety Seal and Protector.** P. Rich, Houston, Tex.

2,069,888. **Horseshoe.** W. H. Laws, Sr., Hamilton, Ont., Canada.

2,069,891. **Hose.** A. D. Maclachlan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,069,942. **Suction Cup.** J. H. Cohen, assignor to Casco Products Corp., both of Bridgeport, Conn.

2,070,016. **Hose Supporter.** S. Lipton, New York, N. Y.

2,070,048. **Eraser.** R. S. Henderson, Morristown, assignor to Weldon Roberts Rubber Co., Newark, both in N. J.

2,070,066. **Inner Tube.** M. A. Picardi, Philadelphia, Pa.

2,070,081. **Bearing Support.** R. Henry, Rock Island, Ill.

2,070,123. **Bath Sponge.** G. W. Grant, Bucyrus, O.

2,070,214. **Tire Cushioning Unit.** J. Mocharnuk, McCamey, Tex.

2,070,216. **Ear Muff.** S. Rosenberg, Milwaukee, Wis.

2,070,231. **Acid Container.** A. Katona, assignor, by mesne assignments, to Meeka Laboratories, Inc., both of Philadelphia, Pa.

2,070,291. **Coupling.** C. P. McHugh, Passaic, N. J., assignor to Raybestos-Manhattan, Inc., Bridgeport, Conn.

2,070,313. **Cleaner.** A. O. Pieper, Brighton, N. Y.

2,070,314. **Innersole.** J. V. Poole, Abington, assignor to Puritan Mfg. Co., Boston, both in Mass.

2,070,335. **Pile Fabric.** G. S. Hiers, Bala-Cynwyd, assignor to Collins & Aikman Corp., Philadelphia, both in Pa.

2,070,373. **Weatherstrip.** J. F. Schwab, Brooklyn, assignor to Revolving Doors, Inc., New York, both in N. Y.

2,070,377. **Bottle Closure.** E. Simmons, New York, N. Y.

2,070,403. **Ear Plug.** J. P. Hershman, Nottingham, England.

2,070,404. **Metatarsal Arch Support.** Le R. V. Hiles, London, Ont., Canada.

2,070,408. **Garment Hanger.** N. C. Leidgen, assignor of ⅙ to H. O. Dietzel and ⅔ to C. M. Buchanan, all of Detroit, Mich.

2,070,428. **Composition Fuel.** F. H. Ford, assignor to Shaler Co., both of Waupun, Wis.

2,070,448. **Broom Holder.** J. C. Nork, Mahanoy City, Pa.

2,070,461. **Fountain Pen.** A. Watanabe, assignor to Namiki Mfg. Co., Ltd., both of Tokyo, Japan.

2,070,515. **Girdle.** E. H. Miller, Jr., W. D. Schween, and W. L. Crosby, assignors to Miller Corsets, Inc., all of Canandaigua, N. Y.

2,070,621. **Engine Mounting.** S. S. Rathbun, Rockville Centre, N. Y., assignor to R. S. Trott, Denver, Colo.

2,070,727. **Hernia Bandages.** F. A. Hamann, Velp, Netherlands.

2,070,738. **Pump.** W. Klein, Wuppertal-Beyenburg, Germany.

2,070,743. **Electrical Indicating Apparatus.** J. W. McDonnell, Palo Alto, Calif.

2,070,751. **Expansible Diaphragm.** W. A. Reichel, Brooklyn, N. Y., assignor to Bendix Aviation Corp., So. Bend, Ind.

2,070,753. **Sliding Clasp Fastener.** F. Schatzky, Breslau, Germany.

2,070,764. **Abrasive Article.** D. E. Webster, Worcester, Mass., assignor to Norton Co., Worcester, Mass.

2,070,782. **Airplane Engine Mount.** F. R. Canney, assignor to Boeing Aircraft Co., both of Seattle, Wash.

2,070,819. **Tire Cover.** O. U. Zerk, Cleveland, O.

2,070,823. **Support.** F. H. Boling, Arcadia, Fla.

2,070,834. **Suction Nozzle.** F. J. R. Karlstrom, Stockholm, Sweden, assignor to Electrolux Corp., Dover, Del.

2,070,839. **Running Board Assembly.** B. C. Place, assignor of ½ to G. E. Gagnier, both of Detroit, Mich.

2,070,861. **Waterproof Insulating Material.** W. R. Gillies, assignor to Union Asbestos & Rubber Co., both of Chicago, Ill.

2,070,981. **Flat Tire Indicator.** A. J. Barnhart and R. F. Essert, both of Placentia, Calif.

2,070,995. **Wheel Balancing Device.** F. E. Mechling, Akron, assignor of one-half to G. A. Wiedemer, Wadsworth, both in O.

2,071,077. **Flexible Nozzle.** Ward Leathers, Haworth, N. J., assignor to Quadrex Corp., New York, N. Y.

2,071,101. **Sprinkler.** C. E. Anderson, E. Orange, assignor to Eastern Tool & Mfg. Co., Bloomfield, both in N. J.

2,071,127. **Syringe.** J. L. Jones, St. Petersburg, Fla.

2,071,146. **Footwear.** E. B. Ward, W. Springfield, Mass.

2,071,152. **Pressure Relief Valve.** E. W. Work, Toronto, Ont., Canada, assignor to Beaton & Cadwell Mfg. Co., New Britain, Conn.

2,071,153. **Acoustic Horn.** A. I. Abrahams, New York, N. Y.

2,071,213. **Bladder Attachment.** I. D. Perry, Muskegon, Mich.

2,071,248 **Pessary.** F. L. Campbell, Wilmington, Ill.

2,071,256. **Air Pressure Indicator.** E. M. Dobbs, Mason, assignor of ⅛ to L. Miller, Brownswood, both in Tex.

2,071,298. **Shoe.** E. W. Dunbar, Hudson, assignor to Cambridge Rubber Co., Cambridge, both in Mass.

2,071,299. **Roadway Joint.** J. R. Gammeter, Akron, O.

2,071,310. **Windshield Cleaner.** E. C. Horton, Hamburg, assignor to Trico Products Corp., Buffalo, both in N. Y.

Dominion of Canada

363,645. **Shelf Type Lubricator.** W. M. Gray, Cincinnati, O., U. S. A.

363,655. **Laminated Glass.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. D. Spencer, Widnes, England.

363,668. **Vehicle Bumper.** General Spring Bumper Corp., assignee of H. S. Jandus and B. M. Short, co-inventors, all of Detroit, Mich., U. S. A.

363,689. **Insulated Conductor.** Vega Mfg. Corp., Detroit, Mich., assignee of S. Ruben, New Rochelle, N. Y., both in the U. S. A.

363,705. **Hat Sweat Band.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of S. Adamson, Rye, N. Y., U. S. A.

363,710. **Ankle Protector.** Everlastic, Inc., Chelsea, Mass., assignee of R. Hesse, Pawtucket, R. I., both in the U. S. A.

363,731. **Heel.** Van Mourik Associates, Inc., assignee of H. Van Mourik, both of Detroit, Mich., U. S. A.

363,793. **Arch Support.** W. M. Scholl, Chicago, Ill.

363,829. **Bumper Guard.** General Spring Bumper Corp., assignee of B. M. Short, both of Detroit, Mich., U. S. A.

363,849. **Abrasive Article.** Norton Co., assignee of R. H. Martin, both of Worcester, Mass., U. S. A.

363,886. **Motor Mounting.** Leland Electric Co., assignee of G. H. Leland, both of Dayton, O., U. S. A.

363,902. **Filament Drawing Mechanism.** Whitin Machine Works, Whitinsville, Mass., assignee of J. G. Oswald, Woonsocket, R. I., both in the U. S. A.

363,910. **Patch.** E. Bullis, Amsterdam, and M. Jacobson, Johnstown, co-inventors, both in New York, U. S. A.

363,921. **Tire Tube.** A. G. Fitzgerald, W. Newton, Mass., U. S. A.

363,987. **Trousers Supporter.** Drey, Simpson & Co., Ltd., assignee of H. L. Byrd, both of Stockport, England.

364,016. **Scouring Device.** A. Blustein, inventor, and I. R. Paris, assignee of ½ interest, both of Washington, D. C., U. S. A.

364,031. **Electric Conductor.** Canadian Industries, Ltd., Montreal, P. Q., assignee of E. C. Pitman, Lincroft, N. J., U. S. A.

364,037. **Elastic Webbing.** Granby Elastic Web, Ltd., assignee of P. H. Boivin, both of Granby, P. Q.

364,065. **Shoe Coating Machine Nozzle.** United Shoe Machinery Co. of Canada, Ltd., Montreal, P. Q., assignee of W. L. MacKenzie, Beverly, Mass., U. S. A.

364,071. **Tape.** Van Cleef Bros., assignee of P. Van Cleef, both of Chicago, Ill., U. S. A.

364,092. **Lawn Mower Tire.** M. H. Kluter, Richmond, Ind., U. S. A.

364,101. **Suction Holder.** J. Oliveri, New York, N. Y., U. S. A.

364,116. **Belt Conveyor.** D. W. Coe, Montreal, P. Q.

364,123. **Garment.** M. Shefsky, Toronto, Ont.

364,181. **Weatherstrip.** Bridgeport Coach Lace Co., Inc., Bridgeport, assignee of J. I. Hamm, Fairfield, both in Conn., U. S. A.

364,193. **Inspection Door.** Duffy Mfg. Co., assignee of J. F. Duffy, both of Holland, Mich., U. S. A.

364,195. **Horse Collar.** McCubbing Pneumatic Harness Co., Ltd., assignee of R. McCubbing, both of Dalbeattie, Scotland.

364,203. **Wire Rope.** Technicraft Engineering Corp., assignee of W. T. Wells, both of Los Angeles, Calif., U. S. A.

364,205. **Windshield Wiper.** Trico Products Corp., Buffalo, assignee of

E. C. Horton, Hamburg, both in N. Y., U. S. A.

364,206. **Windshield Cleaner.** Trico Products Corp., Buffalo, assignee of E. C. Horton, Hamburg, both in N. Y., U. S. A.

364,207. **Windshield Wiper Arm.** Trico Products Corp., assignee of H. Hueber, both of Buffalo, N. Y., U. S. A.

364,208. **Windshield Cleaner.** Trico Products Corp., assignee of A. Rappl, both of Buffalo, N. Y., U. S. A.

364,232. **Animal Halter.** J. Gelinas, Shawinigan Falls, P. Q.

364,251. **Footwear.** W. J. Sisman, Aurora, Ont.

364,262. **Garment Support.** W. C. Broadwell, Richmond Hill, N. Y.

364,321. **Vibration Dampener.** Reo Motor Car Co., Lansing, assignee of H. E. Olson, St. Joseph, both in Mich., U. S. A.

364,343. **Paper Machine.** Johns-Manville Corp., New York, assignee of J. W. Hemphill, Bronxville, both in N. Y., U. S. A.

United Kingdom

452,048. **Cam Follower Roller.** British Celanese, Ltd., London, and E. Kinsella, Spondon.

452,059. **Vehicle Spring Suspensions.** R. Patterson, Milngavie.

452,063. **Floor Treating Machines.** British Thompson-Houston Co., Ltd., London.

452,111. **Suction Nozzles.** Electrolux, Ltd., Luton. (Aktiebolaget Electrolux, Stockholm, Sweden.)

452,116. **Aircraft Wings.** J. Gerin, Boulogne-sur-Seine, France.

452,173. **Vehicle Axles.** Michelin & Cie, Puy de Dome, France.

452,260. **Composite Metal Sheets.** E. G. Budd Mfg. Co., assignee of J. Ledwinka, c/o E. G. Budd Mfg. Co., both of Philadelphia, Pa., U. S. A.

452,267. **Stylographs.** J. Donner and F. Jansco, both of Budapest, Hungary.

452,306. **Wells.** W. D. Shaffer and F. J. Schweitzer, Brea, Calif., U. S. A.

452,375. **Moldings.** A. Brooke, Coventry.

452,399. **Powder Blowers.** J. Dixon Crucible Co., assignee of O. D. Shonnard, both of Jersey City, N. J., U. S. A.

452,430. **Vehicle Spring Suspensions.** C. Macbeth, Birmingham.

452,492. **Insoles.** E. Kuch, Wurzburg, Germany.

452,550. **Syringes.** A. Bengston, Dresden, Germany.

452,552. **Escalators.** Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., U. S. A., assignee of J. Dunlop, Park Ridge, Ill., U. S. A.

452,566. **Vehicle Wheels.** A. J. Fortescue, Arncliffe, Australia.

452,607. **Rackets.** A. G. Spalding & Bros. (British), Ltd., London.

452,640. **Jar Covers.** R. Barnes, Blackpool.

452,668. **Reciprocating Motors.** Kingsway Electricals, Ltd., and G. Osmand, both of London.

452,669. **Compound Sheet Materials.** H. Hestnes, San Francisco, Calif., U. S. A.

452,678. **Cables.** Bullers, Ltd., and H. C. R. Dagnall, both of London.

452,719. **Propelling Boats.** F. Budig, Berlin, Germany.

452,732. **Folding Chairs.** Ironsides Mfg. Co., Ltd., and W. J. Spicer, both of Birmingham.

452,755. **Drinking Appliances.** Fordham Pressings, Ltd., and J. F. Parker, both of Wolverhampton.

452,769. **Plate Heat Exchangers.** E. Ahlborn Akt.-Ges., Hildesheim, Germany.

452,771. **Yarns or Threads.** A. H. Stevens, London. (E. G. Budd Mfg. Co., Philadelphia, Pa., U. S. A.)

452,772. **Cables.** A. D. Blumlein and E. C. Cork, both of London.

452,779. **Cables.** Standard Telephones & Cables, Ltd., W. K. Weston, D. Nunn, and M. C. Field, all of London.

452,841. **Screw Propellers.** R. Rhodius, Bremen, Germany.

452,858. **Resilient Mountings.** H. C. Lord, Erie, Pa., U. S. A.

452,865. **Tires.** Dunlop Rubber Co., Ltd., London, and F. G. King, Birmingham.

452,896. **Closuring Collapsible Tubes.** P. P. Mulhens, Cologne, Germany.

452,919. **Mounting Engines.** W. J. Tennant, London.

452,932. **Adhesive Applying Services.** H. G. W. Chichester-Miles, Westminster, and W. Emmerson, Yorkshire.

452,941. **Valves.** J. Bugatti, Bas-Rhin, France.

452,962. **Road Blocks.** E. Lord, Hertfordshire, and W. K. Webster, London.

452,972. **Brushes.** R. Lederer and R. Lowy, both of Vienna, Austria.

452,975. **Hurdles.** J. R. Smith, London.

452,979. **Checking Loom Shuttles, Etc.** G. Bradshaw, Burnley.

452,982. **Driving Belt.** C. Vedy, Louviers, and A. E. Lucet and G. E. Hermet, both of Paris, all in France.

Germany

641,537. **Tire.** R. Hagemann, Braunschweig.

641,896. **Tire Tread.** F. Haufe, Cottbus.

642,023. **None-skid Tire Device.** Max Kanzler, Dresden.

642,308. **Suction Device.** F. Heimann, Berlin.

TRADE MARKS

United States

342,690. **Inviso-Klasp.** Corsets, brassieres, garter belts, etc. Vanity Corset Co., Inc., New York, N. Y.

342,713. **Fascinate.** Brassieres and corsets. The H. & W. Co., Inc., New York, N. Y.

342,720. Oval of a man wearing a rubber ice cap and the words: **"Rubber-Ice-Skull."** Containers for frozen liquid for use on the head. E. Pomeranz, San Clemente, Calif.

342,764. **Super-Line.** Wires and cables. General Cable Corp., New York.

342,819. **Happy Landings.** Golf balls. P. Herbert, Jr., White Plains, N. Y.

343,007. Triangle with an arrow through it and the words: **"Bendix Nu-Grip Safety."** Tire slotting or retreading machinery. Bendix Products Corp., So. Bend, Ind.

343,038. Representation of roll containing the words: **"Masteroll."** Printers' rollers. Wortman Roller Co., Cincinnati, O.

343,166. **Performite.** Wires and cables. The Okonite Co., Passaic, N. J.

343,253. **Mystery.** Elastic fabrics. Columbia Narrow Fabric Co., Shannock, R. I.

343,270. Label containing the words: **"Abdolere Military Supporter."** Abdominal and reducing belts, reducing corsets, etc. E. Greene, New York, N. Y.

343,323. **Nap-Sac.** Rubber-lined containers for sanitary napkins and the like. National Cellulose Corp., New York, N. Y.

343,387. **Rub-a-Tub.** Brushes for cleaning plumbing fixtures. A. C. McMillen, doing business as Lincolnwood Mfg. Co., Chicago, Ill.

343,420. **Wooster.** Belting. B. L. Duryea, doing business as Duryea Products Co., New York, N. Y.

EUROPEAN NOTES

(Continued from page 68)

seems that recently some of the larger rubber companies had to close down temporarily as, owing to certain taxes which affect only the bigger concerns, and foreign exchange difficulties, their costs became too high to permit them to compete with imported rubber goods. Since the manufacturers have now succeeded in securing a reduction of the taxes and the government will extend facilities in connection with foreign currency, operations will probably be resumed shortly. There are at present about 16 rubber goods factories in Turkey, the majority of which are small. The three largest are the Gislaved company, which employs 700 workers; Michael Tschikwaschvili, which has 350 employes, and Istanbul Lastik Fabrikasi, with 300 employes. Next come three medium sized firms, the Istepan Janeff with 100 workers, Haschim Zorlu with 80, and Emin with 30. The remaining ten are mostly in the nature of workshops and employ altogether about 90 persons. The main article of production is footwear, and imports of crude rubber were about 350 tons last year.

In August, 1936, the Ardal company leased the works of the Polish rubber company, Pepege, for a period of three years; and despite difficulties attending the securing of raw materials and the necessity of modernizing equipment, it was employing 1,000 persons in the production of rubber footwear one month after the contract was signed. But as footwear alone proved insufficient, it was found necessary to add other lines of manufacture. The various factories of the Pepege had not been used for several years before the Ardal took them over, so considerable sums will have to be expended to bring them into proper working condition again and to equip them for the new work. Ardal was ready to invest these amounts, but asked for extension of the lease to give it time to write off these investments. This request was granted, and a new contract was signed at the end of last year, giving Ardal the use of the Pepege factories to January 1, 1942.

Financial

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y. For 1936: net profit, $4,454,930, equal to $1.77 each on the combined Class A and B common shares, against $4,062,160, or $1.61 a share, earned in 1935.

American Hard Rubber Co., 11 Mercer St., New York, N. Y. For 1936: net profit, $283,288, equal after 8% preferred dividends to $1.55 each on 65,503 shares of $50-par common stock, compared with $145,727, or $6.42 each on 22,682 shares of 8% preferred stock in 1935.

American Zinc, Lead & Smelting Co., Columbus, O., and subsidiaries. For 1936: net profit, $52,336, after surtax on undistributed income, equal to 69¢ each on 75,000 shares of $25 par, $5 convertible prior preferred stock. In 1935 there was a net loss of $219,150. Net profit for December quarter, $93,420, equal to $1.24 a preferred share, compared with net loss of $8,448 in preceding quarter and $60,909 loss in fourth quarter of 1935.

Armstrong Rubber Co., Inc., West Haven, Conn. For 1936: net income, $41,512, equivalent to 78¢ a share. The company had no funded debt on December 31, 1936. Current assets were $875,098 against current liabilities of $458,404. Current assets include inventories of $660,136 taken at cost or market value, whichever was lower.

Canada Wire & Cable Co., Ltd., Montreal East, P. Q., Canada, and subsidiaries. For 1936: net profit, $352,041, compared with $195,064 in 1935.

Columbian Carbon Co., 41 E. 42nd St., New York, N. Y., and subsidiaries. For 1936: net profit, $4,021,137, equivalent to $7.48 a share on 537,411 shares outstanding at the year-end, compared with $2,992,860, or $5.56 a share, in 1935, after all charges, including estimated federal surtax on undistributed profits. Sales in 1936 were the largest in the company's history, rising 18% over 1935 to $13,872,389. Deliveries of carbon black rose 19% to a new high record, and sales of natural gas established a new record, jumping 35% over the year before. Dividends paid in 1936 amounted to $5.75 a share, against $4.40 in 1935.

Converse Rubber Co., Malden, Mass., and subsidiaries. March 29, 1936, to Jan. 16, 1937: net income, $245,171; gross sales, $2,940,623.

Dewey & Almy Chemical Co., Cambridge, Mass., and subsidiaries. For 1936: net income after surtax, $395,552, equal after dividend requirements on all classes of preferred to $3.94 each on 60,343 shares of common and Class A common stock. Net income in 1935 was $345,671, or $3.11 a share on common and A common.

Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill. For 1936: net income, after surtax on undistributed profits, $377,229, compared with net income of $211,942 in 1935.

Fisk Rubber Corp., Chicopee Falls, Mass., and subsidiaries. For 1936: net sales, $13,456,554, an increase of 23.7% over 1935. Net profit, after deducting $525,754 for depreciation and after providing $1,329,310 for excise and other taxes, $243,643, against a net loss of $274,775 for the year ended December 31, 1935. Dividends of $6.00 per share on preferred stock were paid out of earnings during the year, and provision has been made for sinking fund requirements. Current assets as at December 31, 1936, were $10,184,346, and current liabilities, $1,403,557, a ratio of 7.3 to 1. Inventories of raw materials as well as the rubber and cotton content of finished product were valued at cost, which was below current market prices.

Flintkote Co., E. Rutherford, N. J., and subsidiaries. For 1936: net income, $1,171,034, equal to $1.75 a share on the capital stock, compared with $1,309,779, or $1.96 a share, earned in 1935. The figures include $5,755 for 1936 and $103,319 for 1935 received in settlement of patent infringements and other claims. Net sales were $13,676,258, an increase of $2,531,214 from 1935.

Garlock Packing Co., Palmyra, N. Y., and subsidiaries. For 1936: net income, $1,061,648, after inventory adjustments, provision of $11,385 for surtax on undistributed profits, and other charges, equal to $5.07 each on 209,250 no-par shares of capital stock, excluding 4,715 shares held in the treasury. This compares with $695,585, or $3.32 a share in 1935.

General Cable Corp., 420 Lexington Ave., New York, N. Y. For 1936: net income after $50,000 surtax on undistributed profits, $1,654,178, equal, after annual dividend requirements on 7% cumulative preferred stock, to $1.64 each on 368,353 non-cumulative $4 Class A shares. Net income in 1935, revised, was $407,839, equal to $2.72 each on 150,000 shares of 7% preferred stock. Dividends in arrears on preferred stock from February 1, 1932, to October 31, 1936, amounted to $4,987,500, or $33.25 a share.

Intercontinental Rubber Co., 745 Fifth Ave., New York, N. Y., and subsidiaries. For 1936: net income, $19,667, after federal and foreign income taxes, equal to 3¢ each on 595,832 no-par capital shares, including 428 shares to be issued under a reorganization plan and excluding 172 shares in the treasury. There was a net loss of $92,543 in 1935.

Jenkins Bros., Bridgeport, Conn. For 1936: net income, $336,769, equal after 7% preferred dividends to $2.34 each on 125,716 common shares, compared with $165,918, or 98¢ a share, in 1935.

Lima Cord Sole & Heel Co., Lima, O., For 1936: net income, $105,676, equal to 94¢ a share on 112,600 shares, present capitalization, compared to $42,656, or 38¢ a share, the year before.

Monsanto Chemical Co., St. Louis, Mo., and subsidiaries. For 1936: net profits, $4,605,593. After allowance for the dividends of the company's British subsidiary's preference shares and minority interest, earnings applicable to Monsanto's common stock were $4,468,703, equivalent to $4.01 a share on the 1,114,409 shares outstanding December 31, 1936. After similar allowances, 1935 net earnings applicable to the common stock were $3,843,390, or $3.84½ a share on the 999,123 shares then outstanding. Sales for 1936 rose to $28,848,438, an increase of 16.8% over 1935 sales. Gross profit for 1936 increased $1,023,197 over 1935.

Mt. Vernon-Woodberry Mills, Inc., Baltimore, Md. For 1936: net income, $653,109, equal to $4.60 each on 45,119 common shares, after preferred dividend requirements, compared with $174,012, or $2.74 a share on 63,620 preferred shares the year before.

St. Joseph Lead Co., 250 Park Ave., New York, N. Y., and subsidiaries. For 1936: profit of $3,409,632 after interest and depreciation, but before abandoned leases, depletion, and federal income taxes, compared with a profit of $933,746 in 1935. After aforementioned deductions, net income in 1936 was $2,511,002, equal to $1.28 each on 1,955,679 shares of $10 par capital stock, compared with a net income of $486,200, or 25¢ a share, in 1935. The company had no liability for 1936 surtax on undistributed earnings. The balance sheet of December 31, 1936, shows that current assets, including $1,835,607 cash, amounted to $12,127,806, and current liabilities totaled $1,867,220. At the close of the previous year cash and marketable securities totaled $1,842,447, current assets $11,744,655, and current liabilities $974,539. Inventories of $6,993,143 compared with $8,413,335 at the end of 1935. Last year

the company paid off $2,500,000 of five-year 3% bank notes, due on June 17, 1940. Beginning 1937 the company earnings will be based upon the difference between selling price and current cost of production.

Servus Rubber Co., Rock Island, Ill. For 1936: net profit, $125,617.54, against loss of $52,919.06 in 1935. Total current liabilities decreased $149,170.45 within the year, and long-term notes payable decreased $125,000. Capital stock showed large reductions, and surplus is listed at $632,971.07.

Super Mold Corp. of California, Lodi, Calif. Six months to Jan. 31: net income, $42,413, equal to $1.06 each on 40,000 shares.

Thermoid Co., Trenton, N. J. For 1936: gross sales, $6,708,811; net profit, $301,627. After allowing for federal income taxes and surtax on undistributed earnings, a balance of $255,417 was available for total annual preferred dividend requirements of $121,668. After allowing for preferred dividends, the balance for surplus was $133,749.

United States Rubber Co., 1790 Broadway, New York, N. Y., and subsidiaries. For 1936: net sales, $160,361,026, an increase of $32,567,411, or 25% over the previous year. Net profit after all current charges except income taxes and inventory reserves, $13,280,021, an increase of $3,911,824 over 1935. Net income, $10,172,484, an increase of $3,640,247. A further reserve of $700,000 was set aside from current earnings to provide for the wide fluctuations, under present economic conditions, in market prices of both crude rubber and cotton. The reduction in deficit for the year was $10,044,071. However it was necessary to charge to the deficit account and credit to the Goodwill, Patents, etc., account an item of $1,506,240 representing surplus of Canadian subsidiaries at the time of their acquisition by Dominion Rubber Co., Ltd. in 1912. This surplus had not been separated between capital and earned surplus until recently, when a study was made by our auditors. Taxes for the year totaled $12,063,000.

Total current assets amounted to $80,646,728, of which $12,822,619 was in cash. Total current and accrued liabilities were $23,693,401. Net current assets were $56,953,327, an increase of $9,674,416 for the year. The ratio of current assets to current liabilities was 3.4 to 1. Total outstanding funded indebtedness was $53,233,700, a reduction of $6,947,500 for the year. The 6½% Serial Notes due March 1, 1937 and 1938 were paid on March 1, 1936, and those due March 1, 1939 and 1940 were paid on September 1, 1936. Also, First Mortgage 5% Bonds having a par value of $1,000,000 were purchased from the trustees of the Insurance Fund. Interest on funded indebtedness was reduced from $3,459,784 in 1935 to $2,848,577 in 1936.

United States Rubber Plantations, Inc., 1790 Broadway, New York, N. Y. For 1936: Profit, $3,585,088 before provision for depreciation and amortization of $1,671,298, which resulted in a net profit for the year of $1,913,790, against $967,695 in 1935. During 1936, 41,594,000 pounds of rubber were shipped, compared with 40,004,000 pounds in 1935. Approximately 99,000 acres of rubber trees (*hevea braziliensis*) have been planted, and 98,000 acres have reached maturity. A total of 42,185,000 pounds of rubber was produced from the 76,563 acres tapped, resulting in an average yield of 551 pounds an acre. There were 11,684 employes, at the close of the year.

U. S. Rubber Reclaiming Co., Inc., 500 Fifth Ave., New York, N. Y. For 1936: net profits, $134,376, equal to $1.76 each on 76,425 shares of $25-par 8% cumulative prior preference stock, on which is an accumulation of unpaid dividends. Net profit in 1935 was $102,057, or $1.35 each on prior preference stock. Accumulated unpaid dividends on the 8% preferred amounted to $821,569, or $10.75 a share, and on the Class A cumulative preferred to $349,771, or $9.75 a share.

Mohawk Rubber Co. (Ohio), Akron, O., and subsidiaries. For 1936: net loss, $18,491, compared with $484,414 loss in 1935.

(*Dividends Declared on page 77*)

New Publications

(*Continued from page 65*)

"Interpreting Company Financial Statements for Employees." A Policyholders Service Bureau of the Metropolitan Life Insurance Co., New York, N. Y. This new report and service is available to those who wish to make known their company's financial condition to the employes. The report includes the methods used successfully by several large companies.

"Wet and Dry." The Foxboro Co., Foxboro, Mass. This comprehensive 40-page bulletin discusses the instruments and application methods for humidity control in a wide range of industrial drying and processing operations. The complete review of modern humidity instrumentation includes descriptions of (1) direct-reading relative humidity recorders, recorder-controllers, and indicating controllers (air or electrically operated); (2) wet and dry bulb (psychometric) recorders, recorder controllers, indicating controllers, non-recording controllers, time-humidity recorder-controllers; and (3) auxiliary equipment as water boxes, valves, ventilating dampers, charts, etc. Supplementing this review of equipment is a discussion of fundamental humidity control principles, including the effects of humidity levels on drying rates, safe temperatures, etc., and the means of integrating humidity control in various drying schedules. Processing operations in which humidity acts to increase the moisture content of the material are also considered.

"The A B C's of V-Belts." The Dayton Rubber Mfg. Co., Dayton, O. A 36-page pamphlet with sketches and cartoons describes fundamental principles of design, construction and use of cog type V-belts for industrial use.

"Tag Laboratory Thermometers and Hydrometers." C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y. In 16 pages with illustrations, Catalog No. 1100A gives a description of and instructions for using Tag etched stem thermometers, hydrometers, and glassware for various purposes. It also includes Baumé specific gravity and Fahrenheit-Centigrade temperature conversion tables.

"Rotating—Cam Switches. CR3300." General Electric Co., Schenectady, N. Y. This four-page leaflet describes the new line of switches designed especially for built-in control applications. Several features such as cam arrangement and operation, heavy-duty fine-silver contact mechanism, special enclosures, and general structural characteristics are described in detail.

"Cotton Duck—Simplified Practice Recommendations R 27-36." Department of Commerce, National Bureau of Standards, Washington, D. C. Printed copies can be obtained from the Superintendent of Documents. Price 5c.

The original recommendation, effective November 1, 1924, listed the standard numbers and regular widths of sail and wide duck. It was revised February 1, 1927, and was reaffirmed without change in 1929, 1931, and 1933. The revision covers the addition of four widths in two numbers of wide duck. This recommendation is effective from November 1, 1936, and is subject to regular review by a standing committee of the industry.

Book Reviews

(*Continued from page 66*)

tures that are of interest to the adult. The text is conversational, largely between a small boy and girl.

The story carries the children from the tapping of trees and preparing of rubber from latex on the plantation through the operations of milling, compounding, calendering, and fabricating the articles to the vulcanization of the final product, particularly as applying to tire manufacture.

The pictures and text enumerate many articles made of rubber and explain such benefits as would be understood by the young mind. The authors merit praise for the selection of pictures and their presentation of this highly educational and interesting story.

HAVE YOU ORDERED YOUR COPIES OF "Compounding Ingredients for Rubber" and "Annals of Rubber"? Did you renew your subscription to INDIA RUBBER WORLD?

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

Futures	Jan. 30	Feb. 27	Mar. 6	Mar. 13	Mar. 20	Mar. 27
Feb.	21.01	.....	.....	.....	.....	.....
Mar.	21.06	21.85	22.85	23.53	24.63	26.25
Apr.	.....	21.90	22.96	23.58	24.65	26.27
June	.....	22.00	23.12	23.68	24.67	26.32
July	21.00	22.10	23.16	23.73	24.66	26.36
Sept.	20.95	22.13	23.20	23.77	24.67	26.27
Dec.	20.90	22.13	23.30	23.78	24.68	26.27
Jan.	.....	22.14	23.31	23.79	24.68	26.28
Volume per week (tons)	12,630	24,170	19,990	31,490	38,430	22,840

THE Commodity Exchange table shows the prices of representative future contracts on the New York market during approximately the past two months.

During March the market trading was very active, and the price on July delivery advanced from 21.18¢ on February 20 to 23.73¢ on March 13 and 26.36¢ on March 27.

On March 16 the International Rubber Regulation Committee met and set the exportable allowance at 90% of the basic quota for the last half of 1937. No change was made for the second quarter, which now stands at 80%.

The following cable was received from Singapore March 25. "The Governor of the Straits Settlements has gone to Kuala Lumpur in connection with the meeting of the United Planters Association of Malaya and representatives of the government, to consider the situation created by the strike of 25,000 laborers at Salangor and Negri Sembilan. Forty-four rubber estates with a total of 75,000 acres are affected, and the strikers are very truculent. Well informed quarters expect that the strike will be settled very soon by increasing wages. It is pointed out that as the annual production per acre varies between 400 and 500 pounds, the present extent of the strike means that only 1,100 to 1,400 tons will not be produced per month."

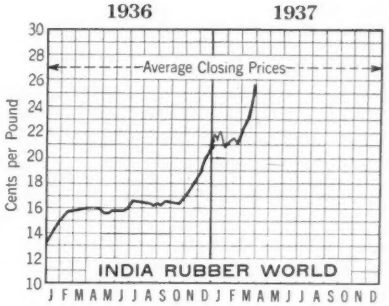
Reports indicate that new estate labor is being recruited and that the Dutch interests will be able to come close, if not up to, their allowable quota.

New York Outside Market

Factory buying was steady throughout March. No. 1 ribbed smoked sheets climbed from 21¢ per pound on February 20 to 26¢ on March 25. Consumption increased somewhat despite the March automobile strike.

The week-end closing prices on No. 1 ribbed smoked sheets follow: February 27, 21 7/8¢; March 6, 22 13/16¢; March 13, 23 3/8¢; March 20, 24 11/16¢; March 27, 26 1/4¢.

(*New York rubber quotations on next page.*)



New York Outside Market—Spot Ribbed Smoked Sheets

"WHEN YOUR SPEEDOMETER GOES TO 50, think of 55 feet. That is how far the car will travel after you decide to stop, before your foot can touch the brake pedal. When the speedometer says 40, think of 44 feet; if 30, think of 33 feet; and so on." *Barney Oldfield.*

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	February, 1937						March, 1937																
	22*	23	24	25	26	27	1	2	3	4	5	6	8	9	10	11	12	13	15	16	17	18	19	20
No. 1 Ribbed Smoked Sheet	..	21 3/16	21 1/4	21 7/16	21 7/16	21 7/16	21 11/16	21 7/16	21 11/16	21 11/16	22 1/4	22 11/16	22 5/16	22 5/16	23 3/16	23 1/16	23 1/16	23 3/16	23 3/16	24 7/16	24 7/16	25 1/16	24 3/4	24 11/16
No. 2 Ribbed Smoked Sheet	..	21 1/16	21 11/16	21 11/16	21 11/16	21 11/16	21 3/4	21 11/16	21 3/4	21 7/8	22 1/16	22 7/16	22 1/16	22 1/16	23 1/16	23	23 1/4	23 1/16	23 1/16	24 1/16	24 1/16	25 1/4	24 11/16	24 5/8
No. 3 Ribbed Smoked Sheet	..	21 1/16	21 11/16	21 11/16	21 11/16	21 11/16	21 3/4	21 11/16	21 3/4	21 7/8	22 1/16	22 7/16	22 1/16	22 1/2	23 1/4	22 15/16	23 1/16	23 1/4	23 1/4	24 3/4	24 3/4	25 1/16	24 5/8	24 13/16
No. 4 Ribbed Smoked Sheet	..	21 1/4	21 5/8	21 3/4	21 3/4	21 3/4	21 11/16	21 3/4	21 11/16	21 15/16	22 3/16	22 11/16	22 3/16	22 7/16	23 1/16	22 7/8	23 1/16	23 1/16	23 3/16	24 11/16	24 5/16	25 1/16	24 1/4	24 7/16
No. 1 Thin Latex Crepe	..	23 1/2	24	24 1/2	24 1/2	24 1/2	24 7/16	24 1/2	24 11/16	24 3/4	25 3/16	25 11/16	25 1/2	25 1/2	26 1/2	25 7/16	26 1/4	26	26 1/16	27 5/8	27 3/4	28 1/16	27 3/4	27 5/8
No. 1 Thick Latex Crepe	..	23 1/2	24	24 1/2	24 1/2	24 1/2	24 7/16	24 1/2	24 11/16	24 3/4	25 3/16	25 11/16	25 1/2	25 1/2	26 1/2	25 7/16	26 1/4	26	26 1/16	27 5/8	27 3/4	28 1/16	27 3/4	27 5/8
No. 1 Brown Crepe	..	21 1/16	21 11/16	21 11/16	21 11/16	21 11/16	21 3/4	21 11/16	21 3/4	21 11/16	22 3/16	22 11/16	22 1/16	22 1/16	23 1/16	22 7/16	23 1/16	23 3/16	23 1/4	24 3/4	24 1/2	24 11/16	24 3/16	24 1/4
No. 2 Brown Crepe	..	21 1/4	21 5/8	21 3/4	21 3/4	21 3/4	21 11/16	21 3/4	21 11/16	21 15/16	22 3/16	22 3/4	22 1/16	22 1/16	23 1/16	22 3/4	23	23 1/16	23 1/16	24 5/16	24 3/16	24 11/16	24 1/4	24 1/16
No. 2 Amber	..	21 1/16	21 11/16	21 11/16	21 11/16	21 11/16	21 3/4	21 11/16	21 3/4	21 11/16	22 3/16	22 11/16	22 1/16	22 1/16	23 1/16	22 7/16	23 1/16	23 1/16	23 1/4	24 3/4	24 1/2	24 11/16	24 3/16	24 1/4
No. 3 Amber	..	21 1/4	21 5/8	21 3/4	21 3/4	21 11/16	21 3/4	21 11/16	21 3/4	22 1/16	22 3/4	22 1/16	22 1/16	22 1/16	23 1/16	22 3/4	23	23 1/16	23 1/16	24 5/16	24 3/16	24 11/16	24 1/4	24 1/16
No. 4 Amber	..	21 1/16	21 1/2	21 5/16	21 5/16	21 5/16	21 1/16	21 5/16	21 1/16	21 3/8	21 11/16	22 3/16	21 5/16	21 5/16	22 3/16	22	22 1/4	22 1/16	22 7/16	24 3/8	24 1/8	24 7/16	24	23 7/16
Rolled Brown	..	20 7/8	21 1/4	21 3/8	21 3/8	21 3/8	21 1/16	21 3/8	21 1/16	21 5/8	22 1/16	22 5/8	22 1/16	22 1/16	22 1/16	22 1/2	22 1/8	22 1/16	22 1/4	23 1/4	23 1/4	23 1/16	23 1/16	23

*Holiday.

New York Outside Market (Continued)

	March, 1937					
	22	23	24	25	26*	27
No. 1 Ribbed Smoked Sheet	24 3/4	24 3/4	25 1/16	25 7/16	..	26 1/4
No. 2 Ribbed Smoked Sheet	24 11/16	24 11/16	25 1/16	25 3/4	..	26 1/8
No. 3 Ribbed Smoked Sheet	24 5/8	24 5/8	25 1/16	25 5/8	..	26
No. 4 Ribbed Smoked Sheet	24 1/2	24 1/2	25 1/16	25 1/2	..	25 7/8
No. 1 Thin Latex Crepe	27 3/4	28 1/4	29 1/16	30	..	30 1/4
No. 1 Thick Latex Crepe	27 3/4	28 1/4	29 1/16	30	..	30 1/4
No. 1 Brown Crepe	24 3/8	24 3/8	25	25 1/16	..	25 11/16
No. 2 Brown Crepe	24 1/4	24 1/4	24 7/16	25 1/16	..	25 1/16
No. 2 Amber	24 3/8	24 3/8	25	25 1/16	..	25 11/16
No. 3 Amber	24 1/4	24 1/4	24 7/16	25 1/16	..	25 1/16
No. 4 Amber	24	24	24 5/16	24 13/16	..	25 1/16
Rolled Brown	23 1/8	23 1/8	23 1/2	23 1/2	..	23 7/8

*Closed.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Pfd.	$2.00 q.	Mar. 31	Mar. 16
Baldwin Rubber Co.	Com.	$0.12½ q.	Apr. 20	Apr. 15
Collyer Insulted Wire Co.	Com.	$0.35	Apr. 1	Mar. 24
Dominion Rubber Co.	Pfd.	$1.75 q.	Mar. 31	Mar. 17
Firestone Tire & Rubber Co.	Com.	$0.50	Apr. 20	Apr. 5
Fisk Rubber Co.	Pfd.	$1.50	Apr. 20	Apr. 10
Flintkote Co.	Com.	$0.25	Mar. 25	Mar. 15
General Tire & Rubber Co.	Pfd.	$1.50 q.	Mar. 31	Mar. 19
Goodyear Tire & Rubber Co. of Canada	Com.	$0.62 q.	Apr. 1	Mar. 15
Goodyear Tire & Rubber Co. of Canada	Pfd.	$0.62½ q.	Apr. 1	Mar. 15
Hewitt Rubber Corp.	Com.	$0.25, initial	Feb. 27	.....
Jenkins Bros	Com.	$0.25, irregular	Mar. 30	Mar. 19
Jenkins Bros., N. J.	Pfd.	$1.75 q.	Mar. 30	Mar. 19
O'Sullivan Rubber Co.	Com.	$0.05	Apr. 1	Mar. 16
O'Sullivan Rubber Co.	6% Pfd.	$0.37½ q., initial	Apr. 1	Mar. 16
Plymouth Rubber Co.	7% Pfd.	$1.75 q.	Apr. 15	Apr. 1

IMPORTS, CONSUMPTION, AND STOCKS

CRUDE rubber consumption by United States manufacturers for February is estimated at 50,282 long tons, against 48,744 long tons for January. February consumption increased 3.2% over January and 36.8% above February, 1936, according to R. M. A. statistics. Consumption for February, 1936, was 36,746 long tons.

Crude rubber imports for February are figured to be 43,289 long tons, an increase of 31.9% over the January figure of 32,820 long tons and 22.9% over the 35,219 long tons imported in February, 1936.

Total domestic stocks of crude rubber on hand February 28 are estimated at 193,864 long tons, which compares with January 31 stocks of 201,915 long tons and 282,902 long tons on hand February 29, 1936.

Crude rubber afloat to U. S. ports as of February 28 is estimated to be 53,538 long tons, compared with 55,096 long tons afloat on January 31 and 46,532 long tons afloat on February 29, 1936.

London and Liverpool Stocks

Week Ended	Tons	
	London	Liverpool
Mar. 6	25,360	34,469
Mar. 13	23,519	32,668
Mar. 20	22,831	31,903
Mar. 27	.....	.....

New York Quotations

New York outside market rubber quotations in cents per pound

	Mar. 27, 1936	Feb. 25, 1937	Mar. 27, 1937
Paras			
Upriver fine	17	21	22½
Upriver fine	*20¾	*27¼	*29⅝
Upriver coarse	12½	14	‡6
Upriver coarse	*17	*20¾	*23⅞
Islands fine	17¾	20½	22½
Islands fine	*20¾	*26	*29¾
Acre, Bolivian fine	17¼	21¾	22¾
Acre, Bolivian fine	*20¾	*27½	*29¾
Beni, Bolivian	17¾	22	23¼
Madeira fine	17	21¼	22¾
Caucho			
Upper ball	12½	14	16
Upper ball	*17	*20¾	*23⅞
Lower ball	12¼	13½	15
Pontianak			
Bandjermasin	7	6	6
Pressed block	12	11/27	10/25
Sarawak	7	6	6
Guayule			
Duro, washed and dried	13	16	16
Ampar	13½	17½	17½
Africans			
Rio Nuñez	15⅛	23	22
Black Kassai	15⅛	23	22
Prime Niger flake	25	29	29
Gutta Percha			
Gutta Siak	11½	10¾	10½
Gutta Soh	12¾	14	14
Red Macassar	2.00	1.05	1.05/1.30
Balata			
Block, Ciudad Bolivar	28	32	32
Manaos block	27	25	27
Surinam sheets	36	33	32
Amber	39	38	40

*Washed and dried crepe. Shipments from Brazil.

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption¶ Tons	U. S. Stocks Mfgrs. Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.—Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1934	469,484	453,223	355,000	47,644	134,927	62,142	1,019,200	944,141	729,391
1935	448,116	491,544	303,000	39,094	164,295	28,304	872,800	942,924	634,196
1936	490,860	573,552	218,844	56,567	78,462	26,969	855,999	.....	455,229
1936									
January	31,292	48,506	285,054	43,870	162,107	31,195	62,726	83,993	569,826
February	35,219	36,746	282,902	46,532	157,028	38,421	64,019	68,635	572,323
March	37,451	42,703	276,823	58,935	147,712	29,322	69,252	80,132	590,475
April	40,370	51,897	264,228	47,678	140,404	32,200	60,030	85,336	527,178
May	35,598	50,482	248,317	48,860	130,590	26,687	68,838	90,090	501,582
June	41,835	52,636	245,886	47,228	122,285	28,260	66,478	87,830	532,992
July	35,881	48,127	234,498	60,343	113,386	29,493	83,850	86,698	490,074
August	42,563	46,657	229,056	63,597	108,215	28,289	71,213	81,378	468,238
September	48,386	46,330	228,477	62,240	103,962	26,936	72,314	82,288	490,961
October	40,920	49,509	219,553	67,825	96,625	24,593	81,756	91,595	448,560
November	44,296	50,303	212,515	73,691	88,781	26,761	78,355	91,595	437,069
December	57,049	49,626	218,844	56,567	78,462	26,969	77,168	93,953	455,205
1937									
January	32,820	48,744	201,915	55,096	71,062	36,365	71,642	90,588	412,114
February	43,289	50,282	193,864	53,538	.....	.....	.....	.....	.....

*Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, and afloat. ¶Corrected to 100% from estimate of reported coverage.

RECLAIMED RUBBER

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption†	Consumption % to Crude	U. S. Stocks*	Exports
1934	110,010	100,597	22.3	23,079	4,737
1935	122,140	113,530	22.9	25,069	5,383
1936	150,571	130,048	22.6	30,573	7,085
1937					
January	15,129	13,366	27.4	31,610	857
February	15,192	13,485	26.8	32,817	...

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage. *Compiled by The Rubber Manufacturers Association, Inc.*

AIDED by the increasing prices of crude rubber with the resulting desire of rubber manufacturers to substitute reclaim for crude and owing to the general increased activity in rubber goods, the demand for reclaimed rubber is up to the production capacity, and in some types of reclaim the full desirable amount cannot be obtained. February production and consumption figures for the United States remained approximately the same as those that are given for January.

The curtailment of automobile production because of strikes during March has not appeared to affect tire production or the demand for reclaimed rubber.

Practically all major suppliers of reclaimed rubber have been and are continuing to modernize and expand their facilities to take care of the demand, and while these activities are not completed at present, the capacity by the end of 1937 should be considerably greater.

Prices shown in the accompanying table, the same as last month, are nominal and owing to the present general situation, future reclaim prices cannot be foretold at this time.

New York Quotations

March 27, 1937

	Sp. Grav.	¢ per Lb.
Auto Tire		
Black Select	1.16-1.18	5¾/ 6
Acid	1.18-1.22	6¾/ 7
Shoe		
Standard	1.56-1.60	6¾/ 7
Tube		
No. 1 Floating	1.00	19 /19¼
Compounded	1.10-1.12	8¾/ 9
Red Tube	1.15-1.30	8¾/ 9¼
Miscellaneous		
Mechanical Blends	1.25-1.50	4¼/ 4¾
White	1.35-1.50	14 /14½

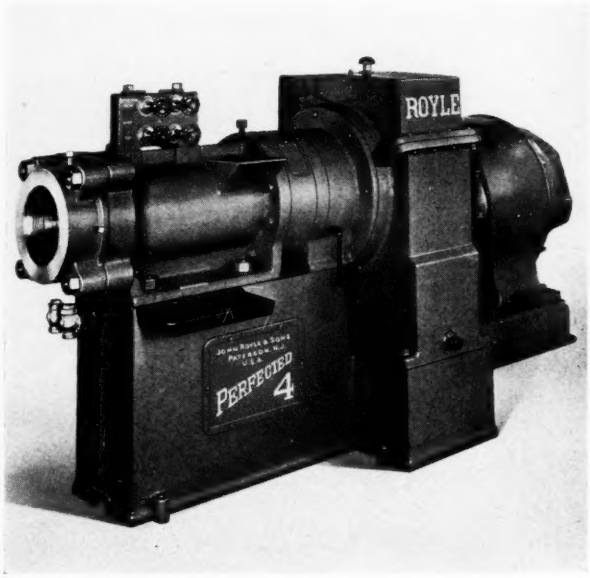
The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Asbestos Steam Hose

NEW YORK BELTING & PACKING CO. has announced a new addition to its line of steam hose. It is the Great Seal Asbestos Cord designed to provide outstanding service in superheated steam service. Made with four asbestos cord plies, wound spirally in alternating directions around a steam and heat resisting tube and embedded

(*Continued on page 82*)

In the plants of
THE WORLD'S LEADING RUBBER MANUFACTURERS



Royle 6-inch Tubing Machine, Herringbone Drive

Year after year Royle extrusion machinery is performing difficult jobs in plants where no excuses go! ! Royle pioneered the extruding machine and still leads the field. Nowhere else will be found the rugged dependability, big production and low maintenance that result from Royle engineering. This broad experience in the extrusion field is at your service.

There is a complete line of modern Royle extrusion machines for straining, tubing and rubber-covering processes.

John Royle & Sons
PATERSON, NEW JERSEY

Royle Sales Agents:
J. C. CLINEFELTER, AKRON, OHIO.
SELSON MACHINE TOOL COMPANY, LONDON, ENGLAND.

ROYLE PATERSON N.J.

Regular and Special Constructions
of
COTTON FABRICS

Single Filling Double Filling
and
ARMY
Ducks

HOSE and BELTING
Ducks

Drills

Selected
Osnaburgs

Curran & Barry
320 BROADWAY
NEW YORK

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Jan. 30	Feb. 27	Mar. 6	Mar. 13	Mar. 20	Mar. 27
Feb.	12.72	.....	.....	.....	.....	.....
Mar.	12.83	13.03	14.02	14.38	.....	.....
Apr.	.....	12.89	13.80	14.16	14.05	14.22
June	.....	12.63	13.50	13.85	13.88	14.05
July	12.49	12.52	13.42	13.75	13.80	13.96
Sept.	12.13	12.13	13.16	13.41	13.46	13.64
Dec.	11.87	11.95	12.97	13.14	13.18	13.45
Jan.	11.86	11.95	13.00	13.15	13.18	13.45

New York Quotations

March 27, 1937

Drills

38-inch 2.00-yard	yd.	$0.17⅜
40-inch 3.47-yard		.10½
50-inch 1.52-yard		.25
52-inch 1.85-yard		.21
52-inch 1.90-yard		.18¾
52-inch 2.20-yard		.17
52-inch 2.50-yard		.15
59-inch 1.85-yard		.19¼

Ducks

38-inch 2.00-yard D. F.	yd.	.17
40-inch 1.45-yard S. F.		.23½
51¼-inch 1.35-yard D. F.		.25¼
72-inch 1.05-yard D. F.	.33	/.34¼
72-inch 17.21-ounce		.36

MECHANICALS

Hose and belting	lb.	.32

TENNIS

52-inch 1.35-yard	yd.	.26

Hollands

GOLD SEAL AND EAGLE

20-inch No. 72	yd.	.11
30-inch No. 72		.20
40-inch No. 72		.22

RED SEAL AND CARDINAL

20-inch	yd.	.09⅝
30-inch		.18
40-inch		.19¼
50-inch		.27

Osnaburgs

40-inch 2.34-yard	yd.	.12⅞/.15
40-inch 2.48-yard		.12⅝/.14⅛
40-inch 2.56-yard		.11¾
40-inch 3.00-yard		.11⅜
40-inch 7-ounce part waste		.11¾
40-inch 10-ounce part waste		.16⅛
37-inch 2.42-yard		.14½

Raincoat Fabrics

COTTON

Bombazine 60 x 64	yd.	.11¼
Plaids 60 x 48		13¾
Surface prints 60 x 64		.14¾
Print cloth, 38½-inch, 60 x 64		.08

SHEETINGS, 40-INCH

48 x 48, 2.50-yard	yd.	.12¾
64 x 68, 3.15-yard		.12¾
56 x 60, 3.60-yard		.10½
44 x 40, 4.25-yard		.08¾

SHEETINGS, 36-INCH

48 x 48, 5.60-yard	yd.	.08
44 x 40, 6.15-yard		.06¾

Tire Fabrics

BUILDER

17¼ ounce 60" 23/11 ply Karded peeler	lb.	.36½

CHAFER

14 ounce 60" 20/8 ply Karded peeler	lb.	.36½
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.36

CORD FABRICS

23/5/3 Karded peeler, 1 1/16" cotton	lb.	.39½
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.36½
23/5/3 Karded peeler, 1¼" cotton	lb.	.46
23/5/3 Combed Egyptian	lb.	.56

LENO BREAKER

8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.38½

THE accompanying table of week-end closing prices on the New York Cotton Exchange shows the change of representative futures during approximately the last two months. Spot middlings on February 23 at a low of 13.08¢ for the period since climbed steadily to 15¢ on March 16, the highest price recorded since 1930. Only two minor setbacks for a one-day interval occurred during this period. From March 16 to 23 spot middlings declined fairly steadily to 14.54¢. Average prices at ten designated southern markets followed closely, but trailed the New York middlings at from 27 to 34 points.

The strong increase in prices was probably due to heavy foreign buying and to strong domestic buying of cotton and cotton fabric. The subsequent falling off in price was believed to be influenced by the automobile strike, threatened labor organization of the textile industry, uncertainty as to the action after April 1 by the Government as affecting cotton, and to a movement in the textile trade to reduce working hours to a 40-hour basis.

Domestic consumption for February was placed by the Bureau of Census at 664,439 bales and for March at 775,000 bales against 678,000 bales actually consumed in January. The February consumption was reported the highest for any February in ten years. An increase in acreage for the coming season of 15 to 20% over the last season is expected.

On March 12, Commodity Credit Corp. announced that from February 1 to midnight March 11 the Reconstruction Finance Corp. received requests for release of approximately 773,339 bales from the 3,000,000 bales of Government 12¢ loom cotton on hand prior to February 1 and from which, it had announced on January 26, reasonable quantities would be released before April 1. There is considerable conjecture as to the action after April 1, particularly regarding the possibility of lowering its differences on low grades comprising the bulk of remaining loom cotton.

On March 19, the New York Cotton Exchange by a vote of 52 to 2 of the membership restored conversion contracts for the purchase and sale of cotton, a form of trading which was prohibited to members by a vote in September, 1935. However, the exchange made such contracts subject to its credit rule and commission laws, which regulations previously did not apply.

Fabrics

The cotton textile market in most instances shows increased prices over last month. The demand for new contracts is less active than a month ago, but still is sufficient to fill in such mechanical spaces as may be available for cloth deliveries earlier than the summer months. Demand for third-quarter deliveries of sheetings has been very active, and the market appears practically void of any goods this side of June.

With the price of raw material driving upward, advancing prices on mill supplies plus impending advances in wages of 10% or more, still higher prices are expected during the next four months. Labor and wage conditions appear to justify the tendency in February of some textile manufacturers to refrain from taking forward engagements without adequate provision for recovery of the increased cost against old contracts represented by the impending wage increases. Legislative limitation of the work week to less than 40 hours is no longer expected.

Cotton of the proper grade for these converting fabrics is scare with prices headed into a range of 15⅝ to 16¼¢ per pound.

RUBBER SCRAP

THE demand for all grades of rubber scrap is very active, and the consumption is at a peak point. The supply appears to be ample to take care of present demand, but no large stock is being accumulated because other types of scrap than rubber are more attractive to the collectors. Prices are the same as last month except inner tubes, which advanced between ¼¢ and ¾¢ per pound.

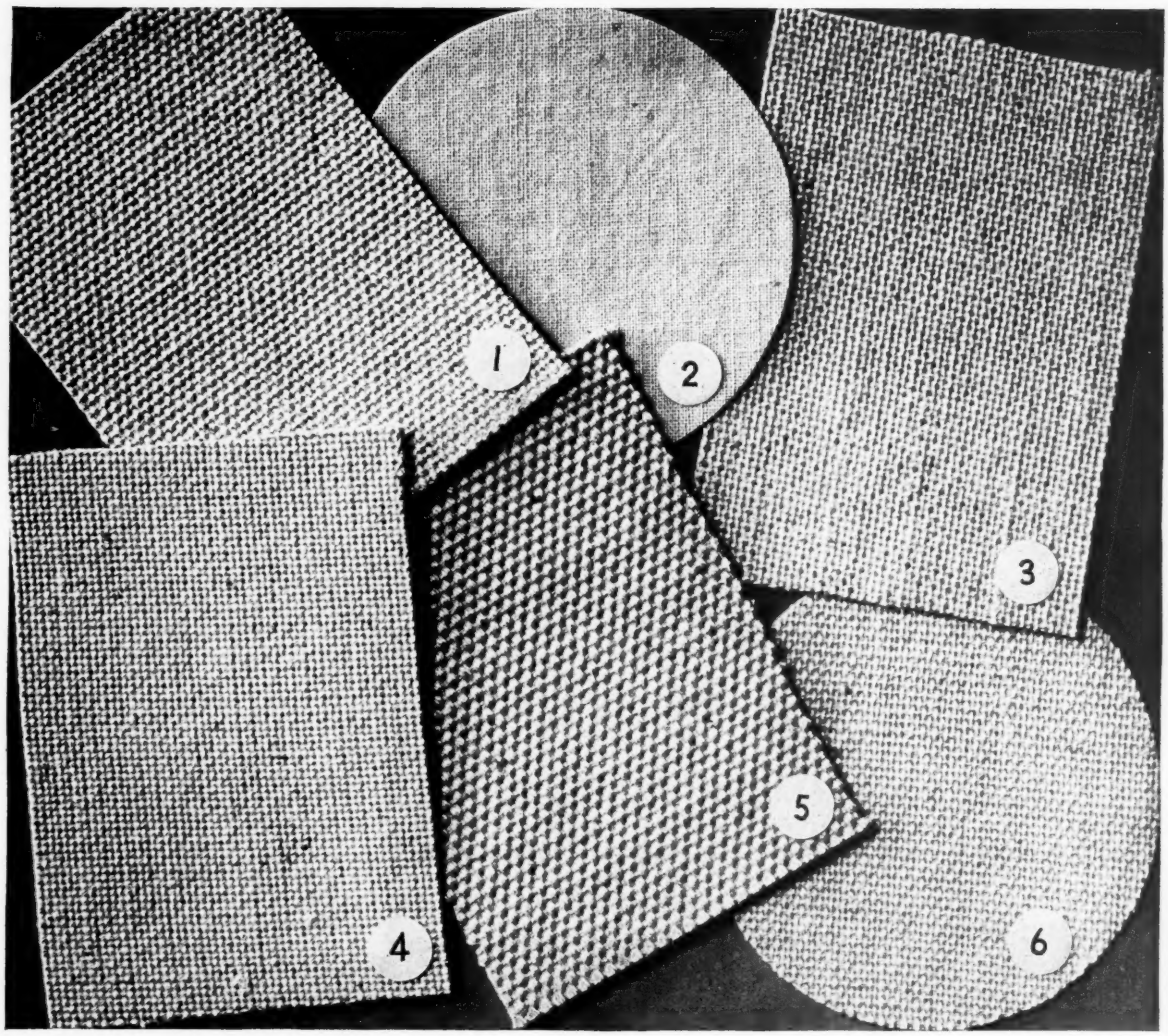
CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

March 27, 1937

Boots and Shoes		Prices
Boots and shoes, black	lb.	$0.01¼/$0.01⅜
Colored	lb.	.00⅞/ .01
Untrimmed arctics	lb.	.00⅞/ .01
Inner Tubes		
No. 1, floating	lb.	.13½/ .14
No. 2, compound	lb.	.06⅛/ .06¼
Red	lb.	.06⅛/ .06¼
Mixed tubes	lb.	.05½/ .05⅝
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	ton	12.50 /13.50
Beadless	ton	17.75 /18.75
Auto tire carcass	ton	24.00 /26.00
Black auto peelings	ton	18.75 /19.75
Solid		
Clean mixed truck	ton	31.00 /32.00
Light gravity	ton	36.00 /37.00
Mechanicals		
Mixed black scrap	ton	25.00 /30.00
Hose, air brake	ton	31.00 /33.00
Garden, rubber covered	ton	16.50 /18.00
Steam and water, soft	ton	16.50 /18.00
No. 1 red	lb.	.03¾/ .04
No. 2 red	lb.	.03 / .03¾
White druggists' sundries	lb.	.04½/ .05
Mechanical	lb.	.04¼/ .04¾
Hard Rubber		
No. 1 hard rubber	lb.	.14½/ .15½

Rubber as Humane Agency. Steel-trap jaws are now being covered with rubber to prevent severe injury or fracture of the leg of the entrapped animal. The rubber covering reduces the possibility of escape because of its gripping power. It also lessens the possibility of damage to the fur.



FABRICS *for use with* RUBBER

With many years of experience in working with the engineers and purchasing agents of the leading rubber companies, we are in position to supply both standard and special fabrics to suit your particular needs.

Seventeen mills and adequate engineering and laboratory facilities assure you of technical excellence and ultimate economy.

The fabrics illustrated above are identified by number in the next column.

1. *OCEANIC Numbered Duck*
2. *COLUMBUS Sheeting*
3. *WEST POINT Osnaburg*
4. *WEST POINT Chafer Fabric*
5. *SHAWMUT Belting Duck*
6. *SHAWMUT Hose Duck*

Our 538-page Handbook of Industrial Fabrics gives a very complete description of cotton, cotton manufacturing processes, uses for industrial fabrics, laboratory test methods, specifications, etc. Price $2.00. One copy free to any well-rated rubber manufacturer in the United States, upon request on company letterhead.

WELLINGTON SEARS COMPANY

65 WORTH STREET NEW YORK

Asbestos Steam Hose

(Continued from page 78)

in rubber, Great Seal has a ply construction which eliminates all possibility of shearing action when the hose expands or is flexed in service. The asbestos cords will not char under high temperatures, and the black heat-resisting cover is specially compounded for this type of service.

Great Seal Cord Steam Hose is comparatively light in weight, flexible, and easy to handle. The spiral cord construction results in a smaller outside diameter than ordinary four-ply asbestos carcass hose. It can also be furnished with a special non-static feature built in. Great Seal comes in the following sizes, all four ply: ½-, ¾-, and 1-inch, 1¼ and 1½ inches I.D., accommodating pressures ranging from 175 to 200 pounds, depending on the size. Maximum lengths are 50 feet.

Eyelet Hose in Irrigation

EYELET hose is an adaptation of porous canvas hose. Made preferably of waterproof canvas, it usually is about three inches in diameter, with four small eyelets around the circumference at intervals of two feet. No matter how eyelet hose may lie, at least two—usually three—outlets are open every two feet for the free discharge of water. These outlets under pressure will throw water six to eight feet to each side, usually making it possible to irrigate each middle of an orchard with only one placement of the hose.

Under ordinary conditions it is estimated that eyelet hose will discharge ten gallons per minute per hundred feet of hose. Usually the hose is made up in lengths of 200 feet, with special brass connecting pieces.

Truck and orchard farmers who irrigate to supplement rainfall are finding eyelet hose practical and economical, especially where the soil is sandy or the water supply limited, according to reports to the Bureau of Agricultural Engineering, United States Department of Agriculture.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	Inquiry
2268	Supplier of white rubber and leadfoil liners.
2269	Supplier of a compounding rosin oil.
2270	Manufacturer of sponge rubber inner soles.
2271	Supplier of latex or rubber solutions to make fabrics water repellent.
2272	Supplier of latex or rubber solutions to make fabrics acid resistant.
2273	Manufacturer of rubber boots.
2274	Manufacturer of belting.
2275	Producer of gas black.
2276	Supplier of scrap rubber.
2277	Manufacturer of mold lubricant suitable for bulb-like articles with small necks causing unusual friction when stripping
2278	Information wanted on Traumaticin.
2279	Manufacturer of automobile outside door handle cover.
2280	Manufacturer of tumbling barrels for both wet and dry molded rubber articles.
2281	Manufacturer of accelerators Vulcafor S.D.C., Z.D.C., S.P.X., and D.D.C.N.
2282	Manufacturer of rubber gloves.
2283	Manufacturer of rubberized sheeting.
2284	Manufacturer of splitters and cutters for sponge rubber.
2285	Manufacturer of machine for cleaning hydraulic press platens.
2286	Manufacturer of rubber footwear.
2287	Manufacturer of mixing bowl of rubber.
2288	Manufacturer of heel molds.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for February, 1937:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom.....	3,145	705
United States.....	17,878	614
Continent of Europe..	10,236	511
British possessions ...	1,188	53
Japan	3,365	34
Other countries	328	1
Totals	36,140	1,918

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	4,824	570
Dutch Borneo	1,854	9
Java and other Dutch islands.	196	..
Sarawak	2,039	..
British Borneo	237	19
Burma	515	12
Siam	2,545	845
French Indo-China	70	212
Other countries	92	9
Totals	12,372	1,676

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.	Australia	Belgium	Canada	Czechoslovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1934	439,100	158,500	9,600	9,100	28,400	11,000	50,400	59,300	21,400	69,900	47,300	60,500	964,500
1935	455,800	128,800	10,000	7,600	26,900	11,200	52,300	62,900	26,100	57,600	37,600	57,100	933,900
1936													
Jan.	33,260	4,573	1,260	760	1,758	767	6,770	5,545	1,500*	4,357	467	5,121	66,138
Feb.	33,789	1,271	735	779	1,900	344	6,288	5,257	1,000*	3,305	94	5,268	60,030
Mar.	33,743	1,227	819	1,033	1,809	410	4,342	4,568	1,000*	5,172	4,376	5,433	61,478
Apr.	44,949	2,097	969	1,097	1,079	603	4,261	5,497	1,500*	4,931	3,251	4,723	70,763
May	35,549	302	1,053	698	2,221	667	4,342	4,639	1,000*	5,531	4,220	4,380	64,602
June	35,901	1,493	1,693	579	2,042	323	4,860	5,698	1,500*	4,567	2,427	4,176	62,273
July	38,556	766	1,455	713	2,274	495	4,631	6,837	2,000*	5,126	1,733	4,532	67,586
Aug.	41,094	1,581	762	789	3,780	989	4,522	6,556	1,500*	4,305	3,128	4,259	70,103
Sept.	49,483	12	2,336	513	2,393	624	4,402	6,006	1,500*	5,197	2,922	5,159	80,523
Oct.	40,301	87	1,124	817	3,110	1,026	4,423	7,232	1,500*	6,602	2,761	5,509	74,318
Nov	37,898	742	997	1,090	4,308	823	3,289	6,500	1,500*	3,934	2,162	5,671	67,430
Dec.	50,838	4,926	1,220	759	1,193	1,701	4,698	7,458	1,500*	8,674	3,500	5,730	82,345

* Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Philippines and Total	Philippines and Oceania	Africa	South America	Mexican Guayule	Grand Total
1934	467,400	379,400	79,100	6,500	6,300	11,100	17,700	17,700	19,600	1,004,800	1,400	3,500	9,100	400	1,019,200
1935	417,000	282,900	54,300	9,100	4,900	8,900	19,500	28,300	28,700	853,600	1,500	5,000	12,200	500	872,800
1936	353,667	309,719	49,692	8,666	5,859	8,177	21,237	34,578	40,830	832,425	1,619*	6,095	14,632	1,228	855,999
1936															
Jan.	36,637	20,778	4,178	419	880	938	2,317	1,665	2,449	60,261	105	494	1,796	70	62,726
Feb.	19,692	27,991	3,664	871	511	529	2,107	3,663	2,894	61,922	225	620	1,177	75	64,019
Mar.	34,597	19,403	4,336	750	574	342	1,848	2,966	2,553	67,369	133	535	1,175	40	69,252
Apr.	21,667	25,255	3,172	413	817	869	2,053	1,596	2,416	58,258	92	533	1,044	103	60,030
May	34,108	22,121	2,560	632	485	517	2,354	2,077	2,282	67,136	103	493	1,018	88	68,838
June	25,115	26,401	3,766	673	553	461	1,386	3,737	2,733	64,825	153	456	947	97	66,478
July	34,214	33,911	3,773	1,048	311	1,035	1,399	3,734	2,738	82,163	155	423	1,013	96	83,850
Aug.	30,253	25,313	3,940	655	121	656	2,541	3,284	3,017	69,780	162	444	681	146	71,213
Sept	34,160	21,835	5,367	588	76	537	1,139	3,259	3,505	70,466	164	508	1,070	106	72,314
Oct.	33,591	28,777	5,599	809	372	1,086	2,143	3,349	3,874	79,600	162	593	1,287	114	81,756
Nov.	30,549	30,476	4,960	607	698	701	1,950	2,260	3,872	76,073	64	396	1,663	159	78,355
Dec.	29,084	27,458	4,377	1,201	461	506	....	2,988	8,497	74,572	101	600*	1,761	134	77,168
1937															
Jan.	24,746	27,278	4,541	498	579	1,234	4,063	3,849	2,828	69,616	100*	500*	1,286	140*	71,642

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

COMPOUNDING INGREDIENTS

IN general the demand has been very active during March, and in some instances the consumption is very close to production quantities. On practically all items prices have not changed.

CARBON BLACK. Current demand holds up at approximately the same firm rate as during the past several months. A notable increase in production is being accomplished, and in a very short time new plants will be in operation so that production will be fully abreast of consumption. Prices remained unchanged.

FACTICE. The requirements for factice and rubber substitutes continue good, and prices remain firm at the same level.

LITHARGE. The demand was good. Prices fluctuated upward with advances of ½¢ the last week in February and another ½¢ the second week in March, with a reduction of ¼¢ just prior to March 22, making a net advance of ¾¢ to a range of 8¾¢ to 9¢ in car lots. Prices for five-ton lots and less were 1¢ per pound under the price listed for red lead.

LITHOPONE. Buying was good. Although many other important opaque pigments have already or will advance around April 1, there has been no sign of higher quotations on lithopone.

RUBBER CHEMICALS. Sales continue to maintain the high level of the last six months. Prices in general have not been increased for the second quarter of 1937.

RUBBER COLORS. Demand has been good, and because of increased prices in basic materials the general trend in prices of colors has been decidedly upward. Chrome Green Oxide advanced 1¢, and the price for reduced Indian Red, 80 to 85%, will be 7¼¢ as of April 1 at producing points and in New York and East St. Louis.

RUBBER SOLVENTS. Market is steady, and the prices remained at 7⅜¢ per gallon.

STEARIC ACID. The demand was steady. Although the price of tallow advanced, no change occurred in the price of stearic acid.

TITANIUM PIGMENTS. Buying was steady, and prices remained unchanged although many opaque pigments did increase.

ZINC OXIDE. Shipments remained good to the tire and the paint trades. Prices advanced ¾¢ to 1¼¢ per pound on various grades. Green Seal and Red Seal advanced 1¢. Holders of contracts were protected to April 1, and contract buyers were purchasing up to their credit limits during the latter part of March.

New York Quotations

March 27, 1937

Prices Not Reported Will Be Supplied on Application

Abrasive			
Pumicestone, powdered	lb.		
Rottenstone, domestic	lb.	$0.03	/$0.03½
Silica, 15	ton	38.00	
Accelerators, Inorganic			
Lime, hydrated	ton	20.00	
Litharge (commercial)	lb.	.08½	
Accelerators, Organic			
A-1	lb.	.26	
A-5-10	lb.	.34	
A-10	lb.	.34	
A-11	lb.	.57	
A-19	lb.	.57	
A-32	lb.	.72	
A-77	lb.	.47	
Accelerator 49	lb.	.42	
808	lb.		
833	lb.		
Acrin	lb.		
Aldehyde ammonia	lb.		
Altax	lb.		
B-J-F	lb.		
Beutene	lb.		
Butyl Zimate	lb.		
C-P-B	lb.		
Captax	lb.		
Crylene	lb.		
Paste	lb.		
D-B-A	lb.		
Di-Esterex	lb.		
Di-Esterex-N	lb.		
DOTG	lb.	.47	
D.O.T.T.U.	lb.		
DPG	lb.	.37	
El-Sixty	lb.	.57	
Ethylideneaniline	lb.		
Formaldehyde P.A.C.	lb.		
Formaldehydeaniline	lb.		
Formaldehyde-para-toluidine	lb.		
Guantal	lb.	.40	/ .50
Hepteen	lb.		
Base	lb.		
Hexamethylenetetramine	lb.		
Lead oleate, No. 999	lb.	.13	
Witco	lb.	.13	
Methylenedianilide	lb.		
Monex	lb.		
Novex	lb.		
O. N. V.	lb.		
Ovac	lb.		
Pipsolene	lb.	1.75	
R-2	lb.	1.65	
Base	lb.	3.60	
R & H 50-D	lb.		
Safex	lb.		
Super-sulphur No. 1	lb.		
No. 2	lb.		
Tetrone A.	lb.		
Thiocarbanilide	lb.		
Thionex	lb.		
Trimene	lb.		
Base	lb.		
Triphenyl guanidine (TPG)	lb.		
Tuads	lb.		
Ureka	lb.	$0.65	
Blend B	lb.	.65	
C	lb.	.60	
Vulcanex	lb.		
Vulcanol	lb.		
Vulcone	lb.		
Z-B-X	lb.		
Z-88-P	lb.	.51	
Zenite	lb.		
A	lb.		
B	lb.		
Zimate	lb.		
ZML	lb.		
Activator			
Barak	lb.		
Age Resisters			
AgeRite Alba	lb.		
Exel	lb.		
Gel	lb.		
Hipar	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
D	lb.		
Syrup	lb.		
White	lb.		
Akroflex C	lb.		
Albasan	lb.		
Antox	lb.		
B-L-E	lb.		
B-X-A	lb.		
Copper Inhibitor X-872	lb.		
Flectol B	lb.	.54	
H	lb.	.54	
White	lb.	1.00	
M-U-F	lb.		
Neozone (standard)	lb.		
A	lb.		
C	lb.		
D	lb.		
E	lb.		
Oxynone	lb.	.68	
Parazone	lb.		
Perflectol	lb.	.67	
Permalux	lb.		
Santoflex A	lb.	.67	
Solux	lb.		
Thermoflex	lb.		
A	lb.		
V-G-B	lb.		
Alkalies			
Caustic soda, flake, Columbia (400 lb. drums)	100 lbs.	3.00	/ 4.00
liquid, 50%	100 lbs.	2.25	
solid (700 lb. drums)	100 lbs.	2.60	/ 3.00
Antiscorch Materials			
Antiscorch T	b.		
Cumar RH	lb.	.09	
Retarder B	lb.		
W	lb.		
T-J-B	lb.		
U.T.B.	lb.		
Antisun Materials			
Heliozone	lb.		
Sunproof	lb.		
Brake Lining Saturant			
B. R. T. No. 3	lb.	$0.0165/$0.0175	
Colors			
BLACK			
Lampblack (commercial)	lb.	.15	
BLUE			
Brilliant	lb.		
Prussian	lb.	.37½	
Toners	lb.	.08	/3.50
BROWN			
Mapico	lb.	.13	
GREEN			
Brilliant	lb.		
Chrome, light	lb.		
medium	lb.		
oxide	lb.	.20	
Dark	lb.		
Guignet's	lb.	.70	
Light	lb.		
Toners	lb.	.85	/ 3.50
ORANGE			
Lake	lb.		
Toners	lb.	.40	/ 1.60
ORCHID			
Toners	lb.	1.50	/ 2.00
PINK			
Toners	lb.	1.50	/ 4.00
PURPLE			
Permanent	lb.		
Toners	lb.	.60	/ 2.00
RED			
Antimony			
Crimson, 15/17%	lb.	.50	
R. M. P. No. 3	lb.	.46	
Sulphur free	lb.	.48	
Golden 15/17%	lb.	.28	
7-A	lb.	.35	
Z-2	lb.	.22	
Aristi	lb.	1.75	
Cadmium, light (400 lbs. bbls.)	lb.	.70	
Chinese	lb.		
Crimson	lb.		
Mapico	lb.	.09¼	
Medium	lb.		
Rub-Er-Red	lb.	.94¼	
Scarlet	lb.		
Toners	lb.	.08	/ 2.00
WHITE			
Lithopone (bags)	lb.	.04¼/	.04½
Albalith Black Label-11	lb.	.04¼/	.04¾

Astrolith (5-ton lots)	lb.	$0.04¼/$0.04½
Azolith	lb.	.04¼
Cryptone-19	lb.	.05¾/ .06¼
CB-21	lb.	.05¾/ .06¼
ZS No. 20	lb.	.09 / .09½
No. 86	lb.	.09 / .09½
Sunolith (5-ton lots)	lb.	.04¼
Ray-Bar	lb.	
Ray-Cal	lb.	
Rayox	lb.	
Titanolith (5-ton lots)	lb.	.05¾
Titanox-A (50-lb. bags)	lb.	.16 / .17
B (50-lb. bags)	lb.	.05¾/ .06
B-30 (50-lb. bags)	lb.	.05¾/ .06
C (50-lb. bags)	lb.	.05¾/ .06
Ti-Tone	lb.	
Zinc Oxide		
Anaconda, Green Seal		
No. 333	lb.	.07½/ .08
Lead Free No. 352	lb.	.06 / .06½
No. 570	lb.	.06 / .06½
No. 577	lb.	.06 / .06½
Red Seal No. 222	lb.	.07 / .07½
U.S.P. No. 777 (bbls.)	lb.	.09 / .09¼
White Seal No. 555	lb.	.08 / .08½
Azo ZZZ-11	lb.	.06 / .06¼
44	lb.	.06 / .06¼
55	lb.	.06 / .06¼
66	lb.	.06 / .06¼
French Process, Florence		
White Seal-7 (bbls.)	lb.	.08 / .08½
Green Seal-8	lb.	.07½/ .08
Red Seal-9	lb.	.07 / .07½
Kadox, Black Label-15	lb.	.06¼/ .06¾
Blue Label-16	lb.	.06¼/ .06¾
Red Label-17	lb.	.06¼/ .06¾
Horse Head Special 3	lb.	.06 / .06½
XX Red-4	lb.	.06 / .06½
23	lb.	.06 / .06½
72	lb.	.06 / .06½
78	lb.	.06 / .06½
80	lb.	.06 / .06½
103	lb.	.06 / .06½
110	lb.	.06 / .06½
St. Joe (lead free)		
Black Label	lb.	.06 / .06¼
Green Label	lb.	.06 / .06¼
Red Label	lb.	.06 / .06¼
U.S.P. X	lb.	.09 / .09¼
White Jack	lb.	.09 / .09¼
YELLOW		
Cadmolith (cadmium yellow), 400 lb. bbls.	lb.	.45
Lemon	lb.	
Mapico	lb.	.09½
Toners	lb.	2.50

Dispersing Agents

Bardol	lb.	.0215/ .024
Darvan	lb.	

Factice

Amberex	lb.	.23
Brown	lb.	.09 / .14
Neophax A	lb.	.13
B	lb.	.13
Fac-Cel B	lb.	.16
C	lb.	.16
White	lb.	.10 / .16

Fillers, Inert

Asbestine, c.l., f.o.b. mills	ton	15.00
Barytes	ton	30.00
f.o.b. St. Louis (50 lb. paper bags)	ton	22.85
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip.	lb.	.03½/ .05
Calcene	ton	37.50 /45.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	
No. 3	ton	
Magnesia, calcined, heavy	lb.	.04
Carbonate	lb.	.06½/ .08½
Pyrax	ton	
Whiting		
Columbia Filler	ton	9.00 /14.00
Domestic	100 lbs.	
Guilders	100 lbs.	
Hakuenka	lb.	
Paris white, English cliff-stone	100 lbs.	
Southwark Brand, Commercial	100 lbs.	
All other grades	100 lbs.	
Suprex, white extra light	ton	45.40 /60.00
heavy	ton	45.40 /60.00
Witco, c.l.	ton	7.00

Fillers for Pliability

P-33	lb.	
Thermax	lb.	
Velvetex	lb.	.03 / .04½

Finishes

IVCO lacquer, clear	gal.	1.00 / 2.25
colors	gal.	2.85 / 3.25
Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00

Flock

Cotton flock, dark	lb.	.11½/ .14
dyed	lb.	.50
white	lb.	$0.14½/$0.20
Rayon flock, colored	lb.	1.25 / 1.60
white	lb.	1.10

Latex Compounding Ingredients

Accelerator 85	lb.	
89	lb.	
122	lb.	
552	lb.	
Alphasol-OS	lb.	.60
Antox, Dispersed	lb.	
Aquarex A	lb.	
D	lb.	
F	lb.	
Areskap No. 50	lb.	.20
No. 100, dry	lb.	.43
Aresket No. 240	lb.	.18
No. 250, alcoholic	lb.	.22
No. 300, dry	lb.	.46
Aresklene No. 375	lb.	.40
No. 400, dry	lb.	.56
Black No. 25, Dispersed	lb.	.22 / .40
Catalpo	ton	
Color Pastes, Dispersed	lb.	
Dispersex No. 15	lb.	.80 / .95
No. 20	lb.	.60 / .75
Emo, brown	lb.	.15
white	lb.	.15
Factice Compound, Dispersed	lb.	.40
Heliozone, Dispersed	lb.	
Igepon A	lb.	
MICRONEX, Colloidal	lb.	.06 / .07
Nekal BX (dry)	lb.	
Palmol	lb.	.11
Paradors	lb.	
S.1. (50-55 gallon drums)	lb.	.65
Stablex A	lb.	.80 / 1.10
B	lb.	.40 / .90
C	lb.	.30 / .50
Sulphur, Dispersed	lb.	.10 / .15
No. 2	lb.	
T.1. (400 lb. drums)	lb.	.40
Tepidone	lb.	
Vulcan Colors	lb.	
Zinc oxide, Colloidal	lb.	
Dispersed	lb.	.09 / .15

Mineral Rubber

B. R. C. No. 20	lb.	.009 / .01
Black Diamond	ton	25.00
Genasco Hydrocarbon, granulated, (fact'y)	ton	
solid	ton	
Gilsonite Hydrocarbon (factory)	ton	
Hydrocarbon, hard	ton	
soft	ton	
Parmr Grade 1	ton	25.00
Grade 2	ton	25.00
Pioneer	ton	
265°	ton	

Mold Lubricants

Mold Paste	lb.	.18
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone	ton	25.00 /35.00

Oil Resistant

AXF	lb.	

Reclaiming Oils

B. R. V.	lb.	.03 / .0325
S. R. O.	lb.	.0175/ .0185

Reenforcers

Carbon Black		
Aerfloted Arrow Specification Black	lb.	.0535/ .0825
Arrow Compact Granulized Carbon Black	lb.	
"Certified" Heavy Compressed, Cabot	lb.	
Spheron	lb.	
Disperso, c.l.	lb.	.0445/ .0535
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed, c.l., f.o.b., New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Excello, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
Fumonex, c.l., f.o.b. works	lb.	.03
ex-warehouse	lb.	.04½
Gastex	lb.	.03 / .07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	$0.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmobile 66, c.l., f.o.b New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock, bags, delivered	lb.	.07½
MICRONEX Beads, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Mark II, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Standard, c.l., f.o.b. Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
W-5, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
W-6, c.l., f.o.b., Gulf ports	lb.	.0445
c.l., delivered New York	lb.	.0535
local, stock, bags, delivered	lb.	.07½
Pelletex	lb.	.03 /$0.07
Supreme, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	0535/ .0735
l.c.l., delivered New York	lb.	.07 / .08¼
"WYEX BLACK"	lb.	
Carbonex	lb.	.029 / .0315
Carbonex "S"	lb.	.0315/ .034
Clays		
Aerfloted Paragon (bulk)	ton	6.50
Suprex No. 1 Selected	ton	10.00
No. 2 Standard	ton	9.00
China	ton	17.50 /20.00
Dixie	ton	
Junior	ton	
McNamee	ton	
Par	ton	
Witco	ton	9.00
Cumar EX	lb.	.035

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Paradors	lb.	
Rodo No. 0	lb.	
No. 10	lb.	

Rubber Substitutes

Black	lb.	.07¾/ .13½
Brown	lb.	.08½/ .14
White	lb.	.09½/ .15¼

Softeners

Burgundy pitch	lb.	.06
Cycline oil	gal.	.20
Palm oil (Witco)	lb.	.07
Pine tar	gal.	
Plastogen	lb.	
Reogen	lb.	
Rosin oil, compounded	gal.	.40
RPA No. 1	lb.	
Rubtack	lb.	.10
Tackol	lb.	.115
Powder	lb.	
Tonox	lb.	.16
Witco No. 20	gal.	.18

Softeners for Hard Rubber Compounding

Resin C Pitch 55° C. M.P.	lb.	.0125/ .0135
Resin C Pitch 70° C. M.P.	lb.	.0125/ .0135
Resin C Pitch 85° C. M.P.	lb.	.0125/ .0135

Solvents

Beta-Trichlorethane	gal.	
Bondogen	lb.	
Carbon bisulphide	lb.	
tetrachloride	lb.	

Stabilizers for Cure

Laurex, ton lots	lb.	
Stearic B	lb.	.11½
Beads	lb.	.10½/ .108
Stearic acid, single pressed	lb.	.11½/ .12
Stearite	100 lbs.	10.50 /11.80
Zinc stearate	lb.	.23

(Continued on page 90)

ADVERTISING PAGES REMOVED

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

WELL-KNOWN CHEMIST AND EXECUTIVE, WITH MANY years of successful theoretical and practical experience in the development and production of rubber thread, rubber covered rolls, tires and pure gum, etc., desires change. Can install new and profitable lines. Willing to invest some capital or take part salary from profits of new departments. Address Box No. 792, care of INDIA RUBBER WORLD.

YOUNG COLLEGE MAN, FOUR YEARS IN RUBBER AND LATEX technology, wants position in progressive organization using latex. Experienced compounder, expert on colors; can organize production and control units from colloidal standpoint. Presently employed by large latex processing company. Will go anywhere. Address Box No. 794, care of INDIA RUBBER WORLD.

RESEARCHER, DEVELOPER OF NEW PROBLEMS, at present employed, is open for business. Have turned problems into profitable business during last few years. Address Box No. 795, care of INDIA RUBBER WORLD.

FACTORY SUPERINTENDENT OR ASSISTANT, EXPERIENCED in soft and hard rubber, mechanicals, calenders, mills and presses. Knowledge in compounding, development, costs and manufacture of bakelite, tenite, and other plastics. Address Box No. 798, care of INDIA RUBBER WORLD.

PRODUCTION EXECUTIVE, WITH PRACTICAL TECHNICAL knowledge based on years of experience in hard rubber, soft mechanicals, extruded and wrapped goods, capable of operating all departments from compounding to shipping, purchasing, costing, and design of equipment or product. Address Box No. 799, care of INDIA RUBBER WORLD.

POSITION WANTED: YOUNG MAN, 11 YEARS' EXPERIENCE IN modern rubber and canvas footwear plant. Thoroughly experienced in mill, calendering, compound, and cutting departments. Complete charge for the past eight years. Desires change where opportunity is greater. Address Box No. 801, care of INDIA RUBBER WORLD.

ACTIVE MAN OF 49 YEARS, WITH 27 YEARS IN TEXTILE rubberizing field, desires position in large or small plant. Extensively experienced in office management, purchasing, production control, payroll and cost work. Familiar with all factory operations. Excellent references. Address R. B. P., 45 Howe St., Wellesley, Mass.

SITUATIONS OPEN

A SMALL PROGRESSIVE MIDDLE WESTERN MANUFACTURER has opening for a young chemist experienced in soft and hard rubber, also mechanical goods. Excellent opportunity. Please give complete information. Address Box No. 796, care of INDIA RUBBER WORLD.

WANTED: EXPERT RUBBER CHEMIST WITH EXPERIENCE OF motor tire retreads for work in European factory. Address full details to Box No. 797, care of INDIA RUBBER WORLD.

WANTED BY TIRE PLANT IN AKRON DISTRICT: RUBBER chemist, with two years' experience in curing tires, with steam or hot water. Give personal details, professional experience, and salary expected. Confidential. Address Box No. 803, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

AN IMPORTANT BRITISH FIRM OF RUBBER CHEMICAL manufacturers, with valuable connection in the industry, will be prepared to consider the manufacture and/or sale of suitable American products in Great Britain. Address Box No. 793, care of INDIA RUBBER WORLD.

FOR RENT

Small rubber plant located in New York City with three mills in good condition and two pot vulcanizers at a very reasonable rental. Address Box No. 800, care of INDIA RUBBER WORLD.

HAVE A RUBBER PRODUCT SOLD EXTENSIVELY TO THE printing trade and retail merchandise field. Have all molds, dies, tools, etc. Business now operating. Lack capital to properly expand. Will make tie-up with mechanical goods plant on any reasonable basis. Profitable volume is assured an aggressive company. Address Box No. 802, care of INDIA RUBBER WORLD.

A WELL-ESTABLISHED RUBBER HEEL DISTRIBUTER FOR SHOE finding trade, having own molds and brand, is seeking connections with a rubber heel manufacturer to make heels for them. All year round volume business. Write particulars, stating location, capacity, etc., to Box No. 804, care of INDIA RUBBER WORLD.

We Have a Completely Equipped Plant for Manufacturing

RUBBER SPECIALTIES

Backed by years of experience.

Let us quote on your requirements without obligation, of course.

ADMIAR RUBBER CO.

273 Van Sinderen Ave., Brooklyn, N. Y.

Division of Ideal Novelty & Toy Co., Inc.
Long Island City, New York

Precipitated Surinam Balata

for Golf Ball Manufacturers. 99 and 54/100 per cent free from resins. Purer and cheaper than you can produce it. You also avoid fire hazards.

Sample and price on request.

HUNTINGDON MANUFACTURING CO. Meadowbrook, Pa.

Having our own machine shops we are fully prepared to offer thoroughly rebuilt and guaranteed:—

ACCUMULATORS	MIXERS	PUMPS
CALENDERS	CHURNS	SPREADERS
CUTTING MACHINES	MOTORS	TUBERS
MILLS	PRESSES	VULCANIZERS

L. ALBERT & SON

Offices and Warehouses

336 Whitehead Road, TRENTON, N. J. Adams, Arch and Union Streets, AKRON, O.

European Office and Representative—Mr. Andre Berjonneau, #33 Blvd. des Batignolles, 33, Paris (VIII) France.

(*Advertisements continued on page 89*)

Rubber Questionnaire

Fourth Quarter, 1936*

	Long Tons			
	Inventory at End of Quarter	Production	Shipments	Consumption
RECLAIMED RUBBER				
Reclaimers solely (6)	3,088	20,425	20,945	.....
Manufacturers who also reclaim (16)	5,237	13,774	2,729	12,195
Other manufacturers (103)	5,119	.....	.....	15,851
Totals	13,444	34,199	23,674	28,046

	Long Tons		
	Inventory	Consumption	Due on Contract
SCRAP RUBBER			
Reclaimers solely (6)	30,097	22,377	11,827
Manufacturers who also reclaim (15)	23,782	13,970	9,522
Other manufacturers (14)	184	.....	.....
Totals	54,063	36,347	21,349

Tons of Rubber Consumed in Rubber Products and Total Sales Value of Shipments

PRODUCTS	Rubber Consumed Long Tons	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and Tire Sundries		
All types pneumatic casings (except bicycle, airplane)	78,647	$76,586,000
All types pneumatic tubes (except bicycle, airplane)	11,578	9,315,000
Bicycle tires, including juvenile pneumatics (single tubes, casings, and tubes)	1,072	1,429,000
Airplane tires and tubes	59	216,000
Solid and cushion tires for highway transportation	140	288,000
All other solid and cushion tires	195	380,000
Tire sundries and repair materials	1,665	2,579,000
Totals	93,356	$90,793,000
Other Rubber Products		
Mechanical rubber goods	13,142	$32,548,000
Boots and shoes	6,105	20,450,000
Insulated wire and cable compounds	2,024	†
Druggists' sundries, medical and surgical rubber goods	1,000	2,549,000
Stationers' rubber goods	540	628,000
Bathing apparel	197	93,000
Miscellaneous rubber sundries	937	1,836,000
Rubber clothing	119	930,600
Automobile fabrics	151	723,000
Other rubberized fabrics	1,128	3,297,000
Hard rubber goods	607	2,818,000
Heels and soles	2,539	3,988,000
Rubber flooring	297	540,000
Sponge rubber	1,032	1,460,000
Sporting goods, toys, and novelties	543	1,423,000
Totals	30,361	$73,283,000
Grand totals—all products	123,717	$164,076,000

Inventory of Rubber in the United States and Afloat

	Long Tons	
	Crude Rubber on Hand	Crude Rubber Afloat
Manufacturers	115,505	6,275
Importers and dealers	67,903	39,218
Totals	183,408	45,493

*Number of rubber manufacturers that reported data was 191; crude rubber importers and dealers, 48; reclaimers (solely), 6; total daily average number of employes on basis of third week of October was 142,879.

It is estimated that the reported grand total crude rubber consumption is 82.8%; grand total sales value, 80%; the grand total crude rubber inventory, 83.8%; afloat figures; unavailable; the reclaimed rubber production 75.9%; reclaimed consumption, 74.8%; and reclaimed inventory, 44% of the total of the entire industry.

†Owing to the difficulty of securing representative sales figures this item has been discontinued.

Compiled from statistics supplied by The Rubber Manufacturers Association, Inc.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	December, 1936		Nine Months Ended December, 1936	
	Pounds	Value	Pounds	Value
UNMANUFACTURED				
Crude rubber, etc.	2,673,053	$453,616	50,175,096	$7,890,656
Gutta percha	1,167	183	10,920	4,281
Rubber, recovered	763,500	36,202	7,396,100	325,249
Rubber, powdered, and gutta percha scrap	342,700	6,221	2,832,900	42,310
Balata	20	27	10,003	2,686
Rubber substitute	42,300	11,391	328,700	94,865
Totals	3,822,740	$507,640	60,753,719	$8,360,047
PARTLY MANUFACTURED				
Hard rubber comb blanks	.....	$119	.....	$2,018
Hard rubber	3,079	2,279	48,641	31,521
Hard rubber tubes	.....	337	.....	2,952
Rubber thread not covered	961	874	36,354	24,430
Totals	4,040	$3,609	84,995	$60,921
MANUFACTURED				
Belting	.....	4,454	.....	68,147
Hose	.....	3,731	.....	59,394
Packing	.....	4,980	.....	46,064
Boots and shoes, *pairs*	2,212	2,718	107,547	47,290
Canvas shoes with rubber soles, *pairs*	.....	.....	110,390	39,514
Clothing, including waterproofed	.....	1,576	.....	18,019
Raincoats, *number*	163	728	8,849	28,995
Gloves, *dozen pairs*	253	683	2,583	6,342
Hot water bottles	.....	1,079	.....	16,940
Liquid rubber compound	.....	.....	.....	20,064
Tires, bicycle, *number*	2,772	1,126	44,961	18,122
Pneumatic, *number*	901	13,192	12,804	139,209
Inner tubes, *number*	170	576	3,646	7,787
Solid for automobiles and motor trucks, *number*	9	468	224	9,178
Other solid tires	.....	425	.....	6,817
Mats and matting	.....	9,363	.....	53,228
Cement	.....	1,515	.....	44,298
Golf balls, *dozens*	130	413	27,126	69,782
Heels, *pairs*	4,605	356	51,818	3,065
Other rubber manufactures	.....	95,698	.....	846,701
Totals	.....	$143,081	.....	$1,548,956
Totals, rubber imports	.....	$654,330	.....	$9,969,924

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
UNMANUFACTURED				
Waste rubber	$10,663	.....	$86,309	.....
MANUFACTURED				
Belting	$54,874	.....	$430,143	.....
Canvas shoes with rubber soles	69,798	.....	720,610	.....
Boots and shoes	254,657	.....	2,804,246	.....
Clothing, including waterproofed	19,400	.....	208,718	.....
Heels	12,702	.....	141,680	.....
Hose	16,298	.....	159,963	.....
Soles	13,322	.....	129,975	.....
Tires, pneumatic	533,012	.....	4,878,152	.....
Not otherwise provided for	3	.....	73	.....
Inner tubes	52,409	.....	436,621	.....
Other rubber manufactures	38,889	$4,753	456,540	$20,518
Totals	$1,065,364	$4,753	$10,366,721	$20,518
Totals, rubber exports	$1,076,027	$4,753	$10,453,030	$20,518

U. S. Crude and Waste Rubber Imports for 1937

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Totals 1937	Totals 1936	Balata	Miscellaneous	Waste
Jan. *tons*	39,674	1.171	625	167	23	160	..	32,820	31,292	13	383	201
Feb.	40,326	2,100	717	15	2	129	..	43,289	35,219	37	1,300	217
Total, 2 mos., 1937 *tons*	71,000	3,271	1,342	182	25	289	..	76,109	.....	50	1,683	418
Total, 2 mos., 1936 *tons*	62,333	2,409	1,147	384	93	145	..	.....	66,511	115	1,535	306

Compiled from The Rubber Manufacturers Association, Inc., statistics.

United States Latex Imports

Year	Pounds	Value
1934	29,276,134	$3,633,253
1935	30,358,748	3,782,222
1936	44,469,504	6,659,899
1937		
Jan.	2,995,027	535,546

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

Classified Advertisements

Continued

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1 Farrel 3-roll 66" Calender; 1 400 H.P. Thropp herringbone reduction gear drive; 1 250 H.P. Chain Drive; 8 Hydraulic Presses, 8" by 8" to 30" by 30"; 1 No. 4 Boyle Tuber, motor drive; 1 Jacketed Vulcanizer, 4' by 6'; 1 Laboratory 2-roll Calender, 14" by 14". Miscellaneous: Compressors; Hoists; Laboratory Equipment; Magnetic Pulleys; Scales; Trucks; etc. REPRESENTATIVE ON PREMISES. ARRANGE FOR INSPECTION. PRICED LOW FOR QUICK REMOVAL. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y. Barclay 7-0600.

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319-323 FRELINGHUYSEN AVE., Cable Address "Urme" NEWARK, N. J.

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	December, 1936		Twelve Months Ended December, 1936	
UNMANUFACTURED—*Free*	Pounds	Value	Pounds	Value
Crude rubber .....1,000 *lbs.*	110,458	$17,555,705	1,046,223	$152,072,496
Liquid latex	4,636,299	735,156	44,469,504	6,659,899
Jelutong or pontianak.....	1,205,612	109,208	13,804,543	1,296,364
Balata	31,722	7,247	1,199,134	199,368
Gutta percha	85,332	16,440	3,229,033	526,323
Guayule	300,000	36,972	2,753,100	286,552
Siak, scrap, reclaimed, etc..	1,138,443	22,639	13,541,626	292,244
Totals	7,507,866	$18,483,367	80,043,163	$161,333,246
Chicle, crude .....*Free*	1,291,138	$298,792	6,749,591	$1,604,848
MANUFACTURED—*Dutiable*				
Rubber tires.....*number*	11,789	$6,498	88,428	$333,944
Rubber boots, shoes, and overshoes .....*pairs*	1,331	728	61,268	11,575
Rubber soled footwear with fabric uppers .....*pairs*	69,628	26,678	1,002,936	249,163
Golf balls .....*number*	2,525	441	530,543	84,136
Lawn tennis balls...*number*	34,560	3,105	442,219	43,217
Other rubber balls...*number*	157,526	6,447	4,341,624	138,045
Other rubber toys, except balls	76,368	11,044	1,184,358	145,650
Hard rubber combs..*number*	46,128	3,086	833,202	49,776
Other manufactures of hard rubber	.....	6,101	.....	33,447
Friction or insulating tape..	9,422	501	340,809	17,163
Belts, hose, packing, and insulating material	.....	17,278	.....	196,996
Druggists' sundries of soft rubber	.....	4,448	.....	85,600
Inflatable swimming belts, floats, etc. .....*number*	1,662	293	662,612	36,314
Other rubber and gutta percha manufactures....*lb.*	92,006	20,926	1,379,285	266,646
Totals	.....	$107,574	.....	$1,691,672

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	1,517,141	$267,745	28,182,445	$4,488,223
Balata	73,593	21,551	340,368	95,514
Guayule	.....	.....	200	28
Gutta percha, rubber substitutes, and scrap.....	10,000	1,250	130,170	12,461
Rubber manufactures	.....	286	.....	15,679
Totals	.....	$290,832	.....	$4,611,905

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	1,595,678	$72,781	15,866,373	$720,424
Scrap	2,287,216	50,467	38,542,306	716,531
Cements .....*gal.*	27,653	20,875	227,100	195,624
Rubberized automobile cloth, *sq. yd.*	39,056	18,375	494,496	230,916
Other rubberized piece goods and hospital sheeting..*sq. yd.*	133,192	51,604	1,228,828	496,086
Footwear				
Boots .....*pairs*	3,550	8,589	68,435	152,097
Shoes .....*pairs*	9,099	8,154	200,479	94,274
Canvas shoes with rubber soles .....*pairs*	21,679	12,251	220,439	126,303
Soles .....*doz. prs.*	3,144	5,460	27,800	51,116
Heels .....*doz. prs.*	77,769	37,689	454,373	270,498
Soling and top lift sheets..	25,494	3,790	423,257	79,050
Gloves and mittens..*doz. prs.*	5,868	13,701	63,438	141,652
Water bottles and fountain syringes .....*number*	19,744	6,989	269,287	96,095
Other druggists' sundries...	.....	46,064	.....	515,040
Gum rubber clothing....*doz.*	22,289	32,214	191,895	281,471
Balloons .....*gross*	47,523	36,027	415,112	363,828
Toys and balls	.....	13,835	.....	147,702
Bathing caps .....*doz.*	1,381	2,243	56,278	90,804
Bands	27,679	9,352	243,781	87,665
Erasers	33,515	17,662	368,146	209,564
Hard rubber goods				
Electrical hard rubber goods	.....	16,603	.....	210,404
Other hard rubber goods..	.....	22,198	.....	254,102
Tires				
Truck and bus casings, *number*	13,254	262,960	173,979	3,469,222
Other automobile casings, *number*	59,860	575,359	684,644	6,381,669
Tubes, auto .....*number*	46,135	72,838	595,621	920,168
Other casings and tubes, *number*	4,864	28,299	50,743	231,168
Solid tires for automobiles and motor trucks..*number*	630	31,052	5,048	153,805
Other solid tires.....	42,900	7,888	1,057,870	165,924
Tire sundries and repair materials	.....	66,694	.....	647,843
Rubber and friction tape....	50,045	12,714	668,576	178,965
Belts and belting.....	251,146	128,997	2,647,726	1,389,324
Hose	496,271	142,373	4,845,064	1,644,207
Packing	138,972	61,682	1,522,382	643,353
Mats, matting, flooring, and tiling	220,202	30,013	1,477,024	203,535
Thread	128,070	62,290	907,765	506,532
Gutta percha manufactures..	67,726	22,790	1,005,171	268,928
Other rubber manufactures..	.....	108,544	.....	1,112,859
Totals	.....	$2,121,416	.....	$23,448,748

Rubber Goods Production Statistics

	1936	1935
TIRES AND TUBES*		
Pneumatic casings	Dec.	Dec.
Production .....*thousands*	5,308	4,051
Shipments, total .....*thousands*	5,015	4,154
Domestic .....*thousands*	4,925	4,087
Stocks, end of month.....*thousands*	11,105	8,196
Inner tubes		
Production .....*thousands*	5,121	4,048
Shipments, total .....*thousands*	4,819	4,034
Domestic .....*thousands*	4,754	3,986
Stocks, end of month.....*thousands*	10,985	8,231
Raw material consumed		
Fabrics .....*thous. of lbs.*	22,649	16,830
MISCELLANEOUS PRODUCTS		
Single and double texture proofed fabrics		
Production .....*thous. of yds.*	3,953	2,447
Rubber and canvas footwear		
Production, total .....*thous. of prs.*	7,599	5,993
Tennis .....*thous. of prs.*	1,951	1,661
Waterproof .....*thous. of prs.*	5,648	4,332
Shipments, total .....*thous. of prs.*	7,409	6,276
Tennis .....*thous. of prs.*	1,295	830
Waterproof .....*thous. of prs.*	6,114	5,446
Shipments, domestic, total.....*thous. of prs.*	7,373	6,252
Tennis .....*thous. of prs.*	1,265	815
Waterproof .....*thous. of prs.*	6,108	5,437
Stocks, total, end of month.....*thous. of prs.*	13,615	14,967
Tennis .....*thous. of prs.*	5,310	6,743
Waterproof .....*thous. of prs.*	8,305	8,224

*Data for January to July, 1935, are estimated to represent approximately 97% of the industry; for August, September, October, November, and December, 1935, the coverage is estimated to be 81%.

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Imports by Customs Districts

	January, 1937		January, 1936	
	*Crude Rubber		*Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	8,196,302	$1,452,804	8,979,810	$1,088,849
Buffalo	.....	.....	56,000	5,740
New York	67,106,533	10.999.195	54.740.061	6,622,836
Philadelphia	3,786,716	600,410	2,168,012	273,174
Maryland	7,126,641	1,148,758	85,220	10,970
Georgia	681,422	106,511	.....	.....
New Orleans	1,130,122	180,857	766,205	95,882
Los Angeles	7,923,997	1,267,852	8,854,478	957,409
San Francisco	467,472	70,293	293,515	37,684
Oregon	11,200	2,000	11,200	1,410
Washington	137,203	22,237	.....	.....
Ohio	590	118	185,578	17,970
Colorado	869,251	136,919	.....	.....
Totals	97,437,449	$15,987,954	76,140,079	$9,111,924

*Crude rubber including latex dry rubber content.

New York Quotations

(*Continued from page 84*)

Synthetic Rubber		
Neoprene Latex Type 50 .....*lb.*		
53 .....*lb.*		
54 .....*lb.*		
Type E .....*lb.*		
"Thiokol" A (f.o.b. Yardville).....*lb.*	$0.35	
Coating Materials		
C-1 Series .....*gal.*	5.50	
C-200 Series .....*gal.*	3.75	/$4.25
D .....*lb.*	.65	
Molding Powder .....*lb.*	.55	/ .70
Tackifier		
B. R. H. No. 2.....*lb.*	.015	/ .016
Varnish		
Shoe .....*gal.*	1.45	
Vulcanizing Ingredients		
Sulphur		
Chloride, drums .....*lb.*	.03½/	.04
Rubber .....100 *lbs.*	2.00	
Telloy .....*lb.*		
Vandex .....*lb.*		
(See also Colors—Antimony)		
Waxes		
Carnauba, No. 3 chalky.....*lb.*	.36	/ .36½
2 N.C. .....*lb.*	.40	/ .41
3 N.C. .....*lb.*	.37½/	.38
1 Yellow .....*lb.*	.46½/	.47
2 .....*lb.*	.45½/	.46
Montan, crude .....*lb.*	.11	/ .11½